INTERNATIONAL

Management Digest

TECHNICAL • INDUSTRIAL • COMMERCIAL

Meet the Fiscal "Doctors"

JULIEN KLEIN

JULIEN SAKS

Who are they, and what happens to a nation's business when they go to work?... p15

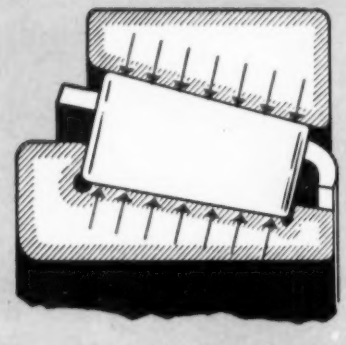
TIMKEN Made in U.S.A.

TRADE-MARK OWNED AND REGISTERED BY THE TIMKEN ROLLER BEARING COMPANY

TAPERED ROLLER BEARINGS *can solve these problems on the machines and equipment you build or buy*

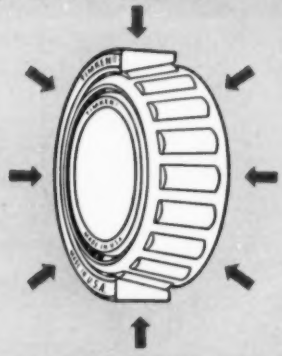
HEAVY LOADS

Loads carried on the rollers and races of Timken bearings are spread evenly over a full line of contact. This greater load area assures extra load-carrying capacity.



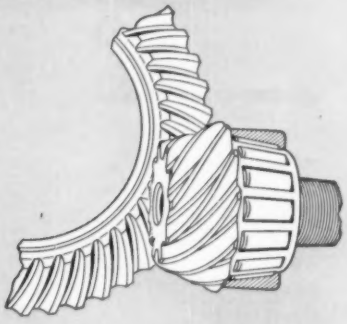
COMBINATION LOADS

Due to their tapered design, Timken bearings carry radial and thrust loads in *any* combination. No auxiliary thrust bearings or plates are needed.



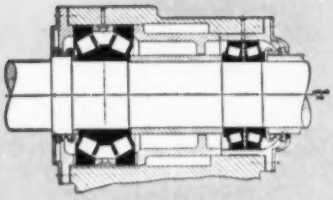
PRECISION

Timken bearings hold shafts in positive alignment, prevent end-movement, minimize deflection. Gears mesh precisely, assuring a smooth flow of power.



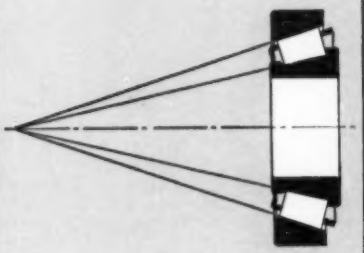
MAINTENANCE

Closures are more effective because Timken bearings keep housing and shaft concentric. Dirt and grit are kept out. Lubricant is kept in.



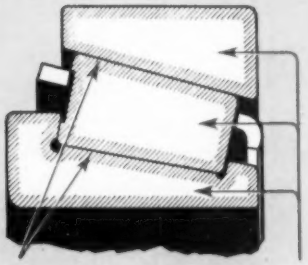
FRICTION

Timken bearings roll freely due to true rolling motion. Lines coincident with the tapered surfaces of rollers and races meet at a common point on the bearing's axis.



WEAR

Rollers and races of Timken bearings are made of Timken fine alloy steel—case-hardened for a hard, wear-resistant surface and a tough shock-resisting core.



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TOUGH, SHOCK-RESISTING CORE

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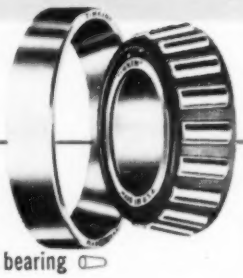

Not just a ball ○
not just a roller ▭
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takes radial ↑ and thrust loads →
or any combination ✳

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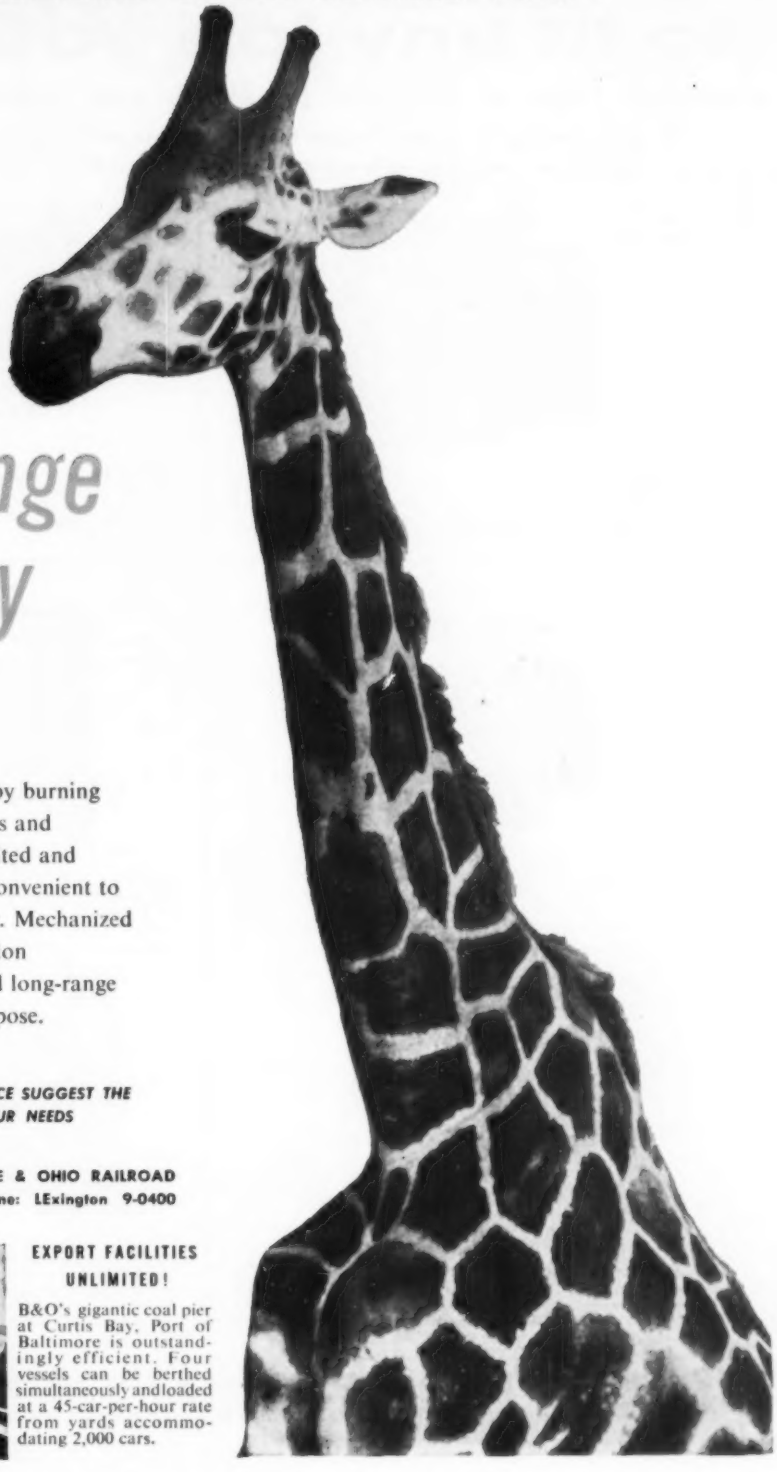

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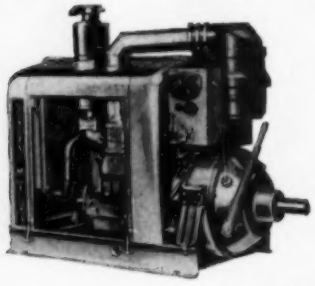

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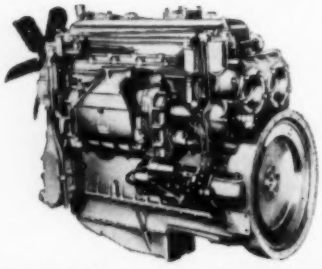

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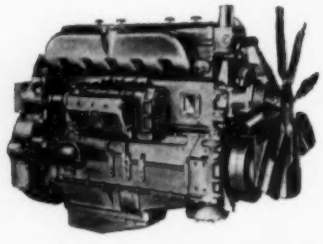

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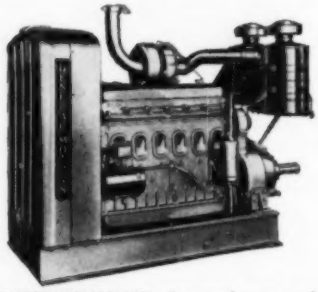

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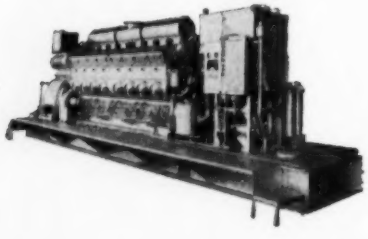

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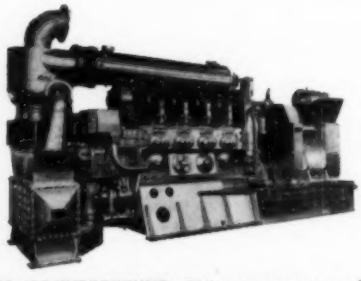

SERIES 498 TURBOPOWER—75% more power per cylinder, less weight and volume per H.P., improved fuel economy, higher thermal efficiency. This adds up to lower installation, operating and maintenance cost. Available in 8, 12 and 16 cylinder units delivering from 1400 H.P. to 2800 H.P. at 850 R.P.M.

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APRIL 1957

VOL. 12 NO. 4

Management Digest.

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NEW YORK CITY
APRIL 1957

New Light on Investment

TO some hopeful souls, private foreign investment is a panacea for all the ills of a young, developing economy. Others recognize its usefulness, but argue that it becomes a dangerous drain on foreign exchange resources. A very few still loudly proclaim that the foreign investor is the avant-garde of "colonialism." There has been much talk, many statistics—but not very much real understanding.

That is why a new study, just now being completed by the United States government, has caused so much comment. The study is unique, the most important of its kind ever made. It provides, for the first time, a measure of the real impact of outside investment upon an entire continent.

The area covered is Latin America; the investors are corporations from the U.S.A. You will find the preliminary results on page 13 and 14.

Some persons will use the study as powerful propaganda to argue the case **for** U.S. investment in Latin America. Others may possibly use portions of the study to argue **against** the Yankee investor. Indeed, the study may start as many new arguments as it silences.

The important thing is that the discussions will be better informed. That is why MANAGEMENT DIGEST welcomes the new study: It helps us to a better understanding of how the world's business works.

And, surprisingly, it helps us to a better understanding of the U.S.A.'s own development. The U.S.A. has a great debt to businessmen of other lands who put so much of their capital to work here in the 19th and early 20th centuries. To be sure, not all of those investors always acted in the best interests of the young U.S.A.—just as not all U.S. investors have always acted in the best interests of other countries. But an immense contribution was made; and the development job was done.

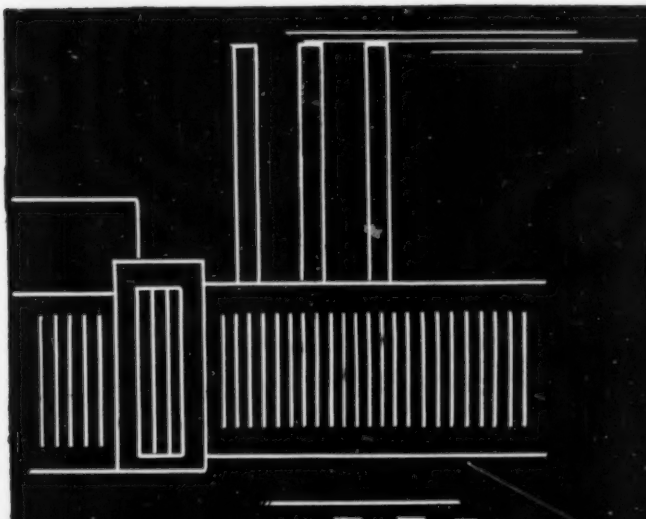
In the last analysis, is not the investor's contribution—or lack of contribution—pretty much determined by the host country? If a nation condones a standard of business morality that allows men to greedily exploit resources and to "get away with something," some foreign investors are going to do it too. If a society insists that its business community be responsible and constructive, the foreign investor will act accordingly. Fortunately, the latter case is becoming the rule, rather than the exception, around the world.

THE economics of magazine publishing is often just as puzzling as international investment. The McGraw-Hill company (as well as any other commercial publishing house) could not possibly produce worthwhile magazines for its million or so readers in the U.S.A. and abroad on income from subscriptions alone. So it sells advertising space to businessmen who want to acquaint the readership with their products and services.

Forgive us if MANAGEMENT DIGEST now points with pride. The April issue carries more advertising than any other in the history of the magazine. We feel that the amount and quality of its advertising is one measure of a magazine's acceptance.

Most important, of course, is the quality of a magazine's audience. That so many leading corporations want to show their wares in MANAGEMENT DIGEST reflects favorably on the business judgment and position of the readers. You should be proud, too.

Paul R. Miller, jr



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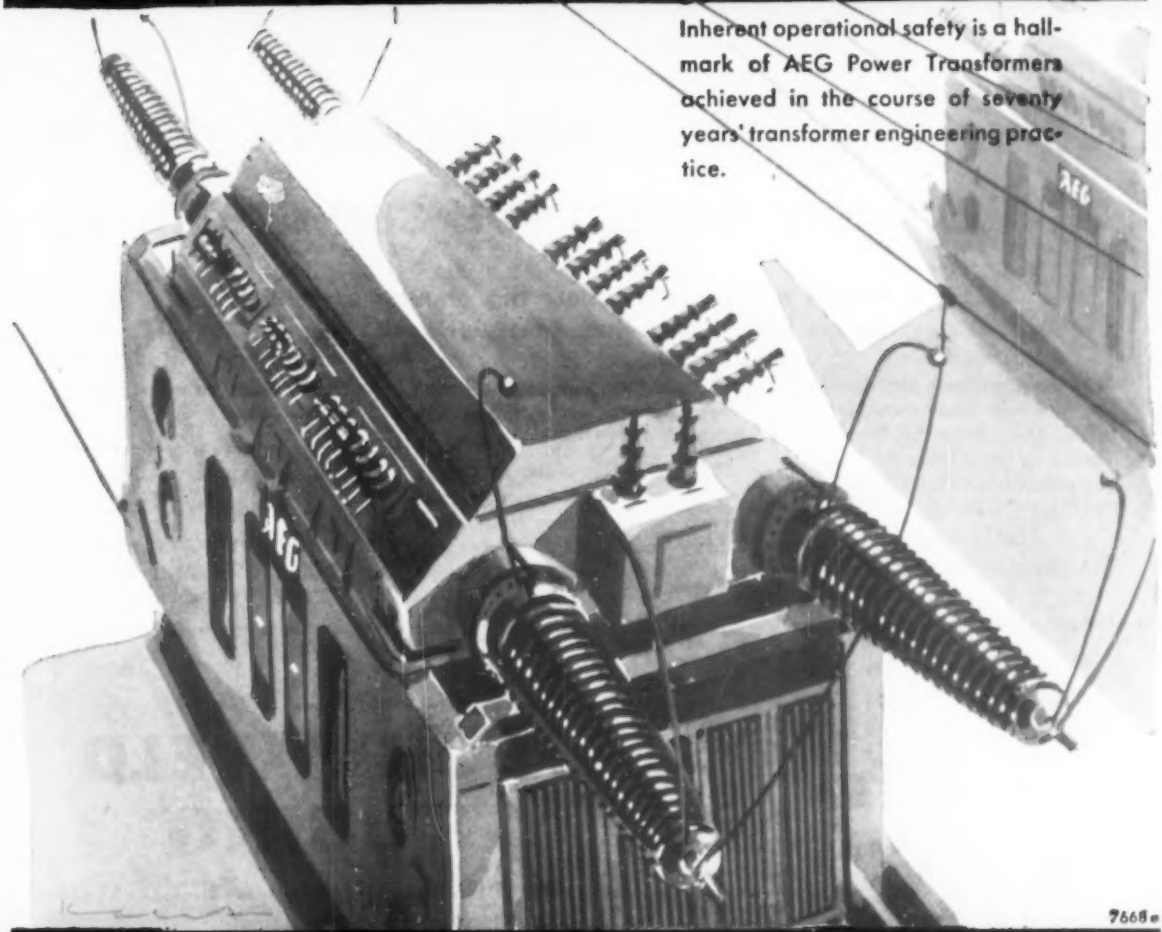

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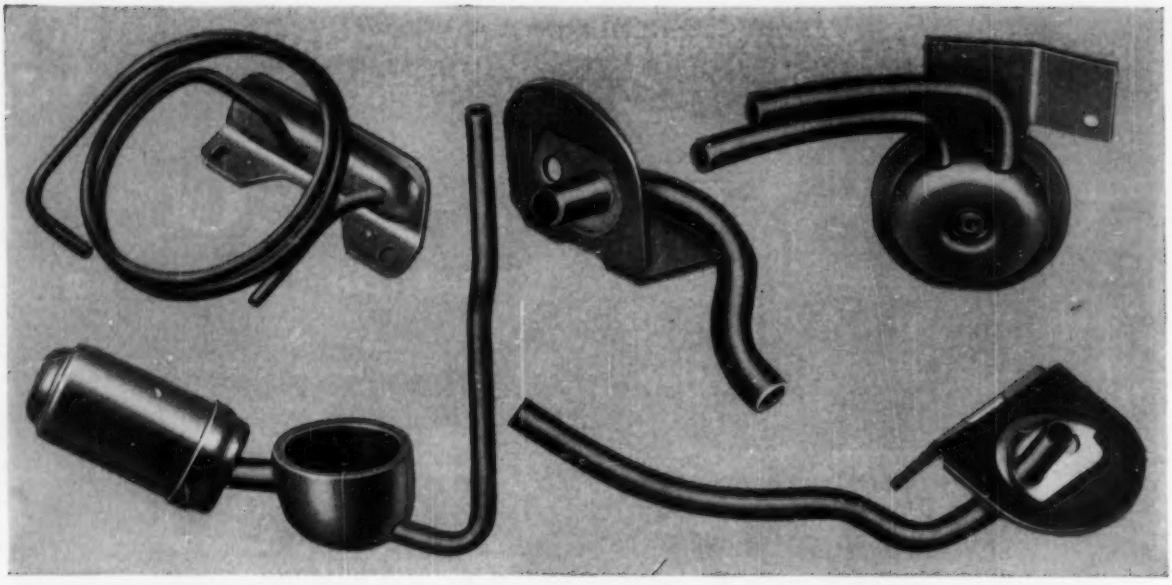

Here is a small sampling of the variety of tubing parts produced for Bundy customers. Many of them involved close cooperation between Bundy engineers and the customers, in solving problems of design and function. Are your tubing designs simple or complex? Do they call for serpentine coils, swaging, flattening, expanding, brazing, saddle jointing, bending to small radii, piercing, upsetting, slotting, threading, angle cutting, notching, flanging, flaring, reducing, tapering, other fabrication operations, or combinations of the above? Come to Bundy for the industry's most reliable tubing, most helpful engineering talents, and most versatile fabrication facilities.

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Take advantage of this unbeatable combination: expert, free engineering service plus genuine Bundyweld Tubing, double-walled but stronger; high thermal conductivity; high bursting strength; takes easily to any fabrication.

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WORLD TRENDS

MIDDLE EAST PERSPECTIVE

There are no real long-range solutions in sight for the Middle East. Perspectives are more valuable than predictions:

Russia cautiously backs the Arabs, France backs Israel. The U.S.A. doesn't want to take sides. Britain's prestige has suffered, but its influence is not completely dead. The West distrusts the strongman of Egypt; Abdel Nasser distrusts the West; and many Arabs distrust Nasser.

What are Western aims? Besides a desire for peace, there is the problem of oil. The Middle East has almost three-fourths of world reserves, and Western reserves are dwindling. The chairman of Socony Mobil Oil Co. says bluntly that the entire Western Hemisphere—not just Europe—will become heavily dependent on Middle East oil within 20 years.

"There is much we can do to better disperse our operations," the oil man says, noting that Syria, Lebanon, and Jordan—which do not produce oil—can now cut off all the major pipelines, and Egypt controls the Suez Canal. He advocates more super tankers, more stockpiling by consuming countries, and pipelines that cannot be shut down by one government.

Pipeline projects—still years away from operation—are in the news. A "super-inch" line from Iraq to the Mediterranean, via Turkey, is a strong probability—perhaps with feeder lines from Kuwait and even Iran.

Also under study is a major line through Israel—from Elath to the Mediterranean—that would bypass all Arab states and the Suez Canal. But that might create as many problems as it would solve.

For the short range, optimists say only that the "active" crisis will subside. They also see some kind of workable, or at least partly workable, compromise between Egypt and the rest of the world on Suez. But they see no real peace—only cold war between Arab and Israeli.

There will be continued ferment in the Arab states. Economic development has been slowed, and inter-Arab cooperation is still limited. While American aid programs will no doubt help, the Middle East may not have a viable, growing economy for years.

Look at the almost insoluble problem of the Palestine refugees, now dependent on the United Nations. There are 925,000 refugees—and their number is increasing at better than 25,000 annually. The two most hopeful resettlement projects—in the Jordan Valley and in Sinai—would absorb only about 250,000, and require years for development. Meanwhile, the refugees provide a focus for continuing hatred and bitterness.

Renewed warfare, a fight to the finish, is not likely in the Middle East. The U.S.A. has committed itself to act as a "watch-dog" in the area. The United Nations, though severely limited in its ability to act, provides the vital forum for arguments. Only the Communists profit by turmoil in the Middle East—and their trouble-making potential is still great.

PRICES—UP OR DOWN?

If you are thinking about prices—and commodity prices in particular:

Commodities may soon face two contrary pressures, reports The Economist. Assuming that the Suez Canal will be open soon, the commodity "pipeline" will shorten, supplies will increase, freight charges will decline

Turn the page for more WORLD TRENDS

further (already there is a drop in dry cargo rates). But—at the same time—business confidence should strengthen, with less worry about oil and war, more industrial activity in Europe and the U.S.A.

Which will prove stronger then: The pressure of potentially higher demand—or of more supplies at the point of consumption? (Even without a Suez opening, demand could increase—and cause prices to stiffen.)

One key factor is the pace of industrial activity in the U.S.A. As MANAGEMENT DIGEST went to press, the business community (and an uncertain stock market) was peering anxiously for signs of the "Spring upturn." It will come, most observers agree, but it could be a "late Spring."

Meanwhile, note the behavior of some of the important commodities.

Copper prices have been falling steadily—but there is a limit (maybe a bit under 30¢ a pound). Producers can defend the price by limiting output . . . **Tin** prices are down, and could go further. But the Tin Agreement (MD, Nov, p13) has ample funds to buy up surpluses . . . Note that U.S. prices of **scrap**—steel, copper, aluminum, waste paper—are weakening. Since scrap prices are far more sensitive to changes in demand than new materials, some observers think they see a trend.

Raw wool prices seem in no danger for several months . . . **Cotton** demand is high as stocks are built up . . . **Rubber** consumption may be less than in 1956—a lot depends on Russian buying . . . **Sugar** is booming, and the recent big Russian purchase in Cuba drained reserve stocks there . . . **Cocoa** prices are at a low point—and there are large stocks . . . No radical changes in **coffee** and **tea** are likely soon.

THE SOVIET SLOWS DOWN

New forces are at work in the Soviet Union. Eventually, they could transform the Soviet economy.

A combination of problems is causing Soviet planners to slow down the industrial growth rate in 1957. The East Europe revolts; pressure by the population for a larger share of national income; high costs of agricultural and military development; manpower shortage; lagging productivity—all these contribute to a dramatic "scaling-down" of industrial goals.

A "revolution in management" may be coming, too. There is to be a greater separation of political and economic authority. Industrial managers will have more to say about how their plants and industries are run; the Communist party bosses will have less. Mikhail Pervukhin has become virtual "Czar" of the economy—and he speaks for the managers.

It will take time before the world can tell whether these changes are permanent or temporary. But one thought stands out: The era of the forced, "bulldozing," Stalinist economic policies may be ending.

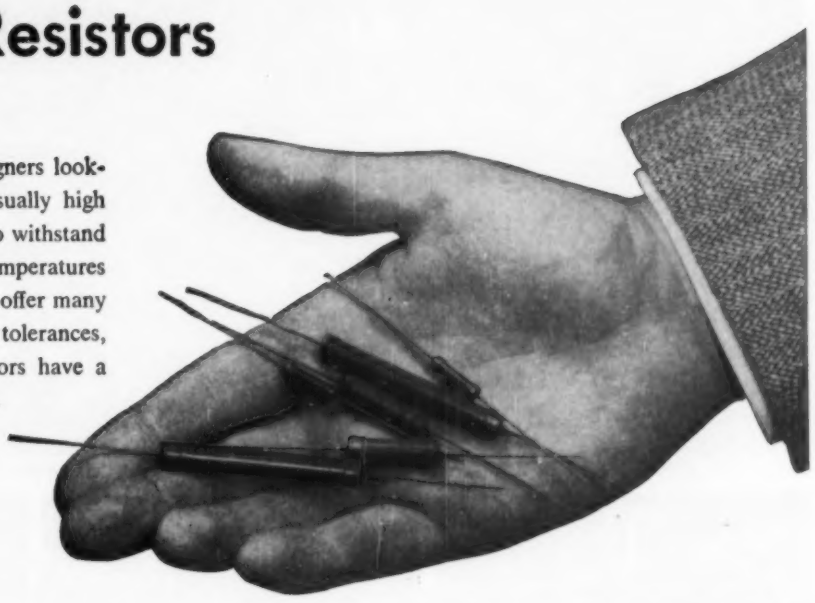
TRENDS IN BRIEF

Ghana, the new West African republic, seeks foreign investment to help raise living standards of 4-million Ghanians and diversify from its dependence on cocoa. The **British West Indies** federation has a battery of tax concessions for foreign business. Biggest potential: Trinidad and Jamaica . . . **Speaking of taxes**: International business men are looking into tax advantages of setting up—in Mexico—holding companies for foreign operations . . . **Spain has its first graduate school** of business management, just opened in Madrid . . . **Brazil has its first "open-end" investment fund.** Designed for large and small investors, it will maintain a portfolio of top grade Brazilian stocks and a few North American securities—and hopes to mobilize capital for new business ventures.

What you should know about

Corning High-Temperature Film-Type Resistors

Manufacturers and electronic designers looking for a resistor which has unusually high electrical stability and the ability to withstand high ambient and high operating temperatures will find Corning Type S Resistors offer many advantages. Mass produced to close tolerances, Type S High Temperature Resistors have a normal resistance tolerance of 2%.



Corning Type S Resistors give you:

Excellent high temperature characteristics—These resistors will operate at ambient temperatures up to 200°C.—have an unusually low temperature coefficient of resistance.

Remarkable stability—The resistive element of Corning Type S Resistors is so stable it can be cycled from near absolute zero to red heat without impairing its electrical properties.

Superior high frequency characteristics—The thin film insures inherent stability and provides excellent high frequency characteristics.

Specifications—Corning Type S Resistors				
Power Rating	SIZE *Length*	SIZE *Diameter*	RESISTANCE *Min. (ohms)*	RESISTANCE *Max. (ohms)*
1 Watt	19/32"	11/64"	10	10,000
2	15/16"	19/64"	10	40,000
4	2 1/16"	19/64"	20	100,000

Rugged construction—The new film material makes integral contact with the heat-resistant base to form a tough bond. Fired-in silver bands afford low resistance, low noise termination.

Space saving—Since they operate at higher power levels, Corning Type S Resistors afford important space savings.

MAIL THE COUPON BELOW FOR ADDITIONAL INFORMATION ON CORNING RESISTORS FOR A WIDE RANGE OF APPLICATIONS

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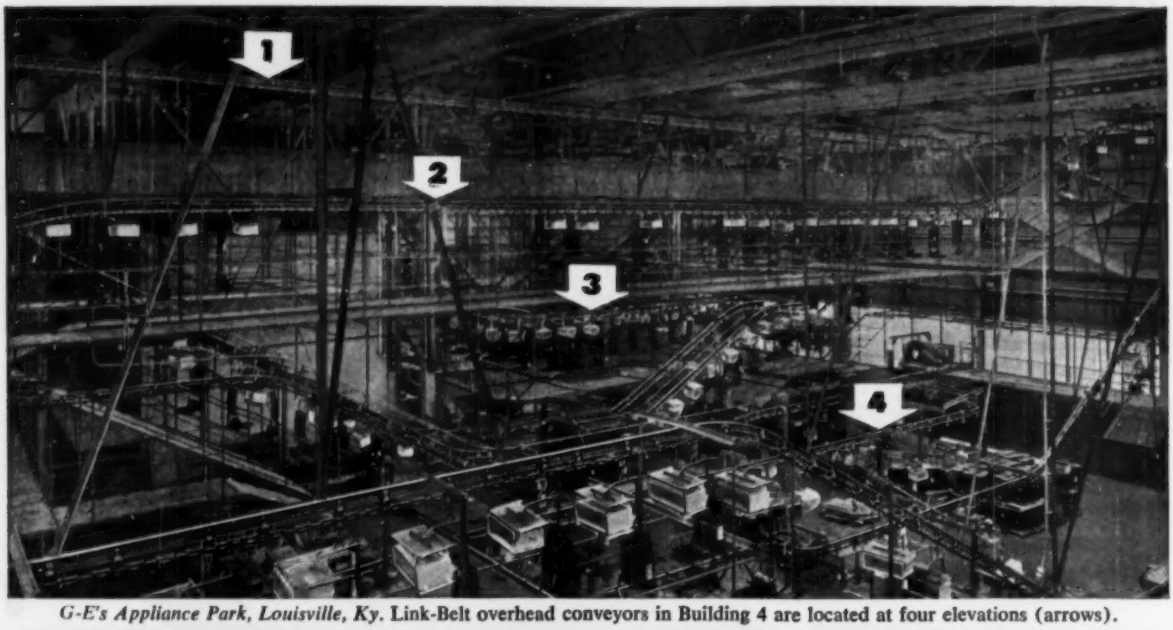
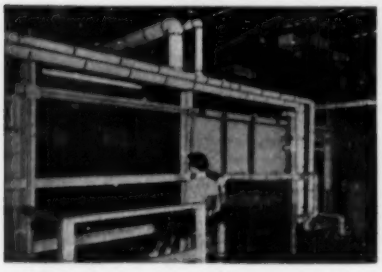
Y3

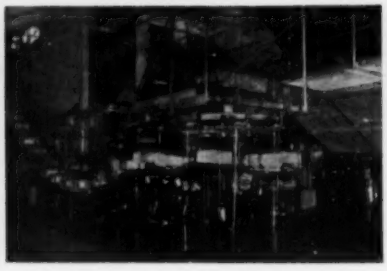
LINK-BELT RESEARCH AND ENGINEERING...WORKING FOR INDUSTRY



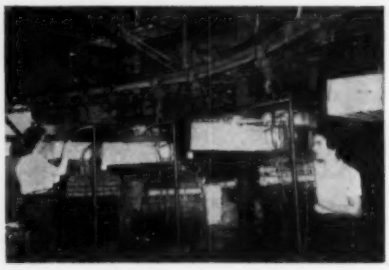
G-E's Appliance Park, Louisville, Ky. Link-Belt overhead conveyors in Building 4 are located at four elevations (arrows).



On-the-move inspection is accomplished as Link-Belt trolley conveyor carries cases through special inspection stations.



Link-Belt also designed trolleys with special welded arms to carry current collectors for five electrified conveyors.



After finishing touches, units will go direct to cabinet assembly line. Plants have *no dead storage* except raw materials.

G. E. makes refrigerators in transit

. . . assembles, tests, stores them on Link-Belt overhead trolley conveyors at Appliance Park, Louisville

SEEKING a practical means of mechanizing refrigerator production, General Electric installed *15½ miles* of Link-Belt overhead trolley conveyors in Appliance Park Buildings 4 and 5. Through parts delivery, assembly and testing . . . during enameling and cabinet fabrication—these conveyors coordinate operations, provide moving storage, permit push-button control over the entire system. Another outstanding aspect of this installation was the speed with which Link-Belt engineers handled complete erection, drawing many superstructure plans *on the spot* as work progressed!

The answer to more efficient handling in your plant may be found in the flexibility of these conveyors—their ability to travel between floors or buildings, rise or drop sharply—plus Link-Belt's experience in applying them. Call your Link-Belt representative for Book 2330, or write direct. LINK-BELT COMPANY, Dept. 457-MD, 2680 Woolworth Bldg., New York 7, N. Y.

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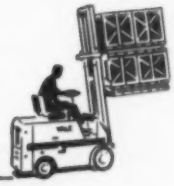
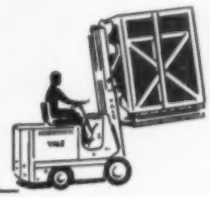


CAPACITIES FROM 2,000 TO 10,000 POUNDS

electric trucks



CAPACITIES FROM 1,000 TO 150,000 POUNDS

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CAPACITIES FROM 1,000 TO 6,000 POUNDS

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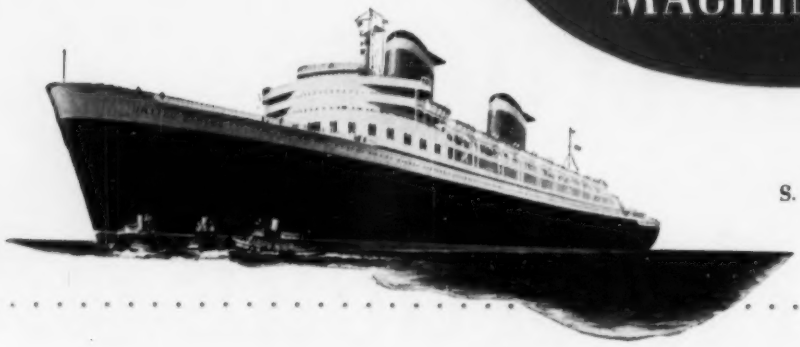
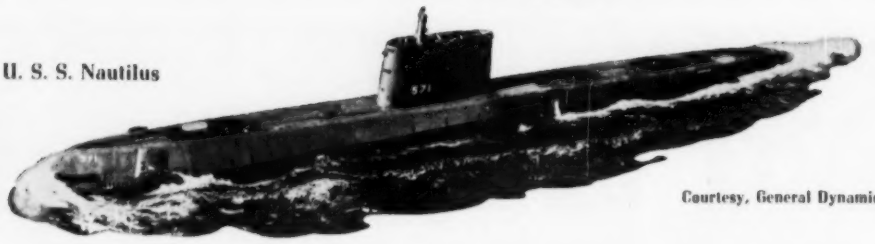


S. S. United States

U. S. S. Nautilus



Courtesy, General Dynamics Corporation

U. S. S. Forrestal

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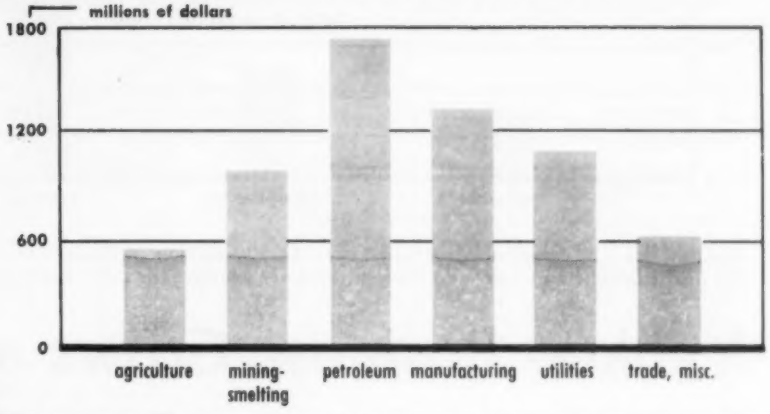
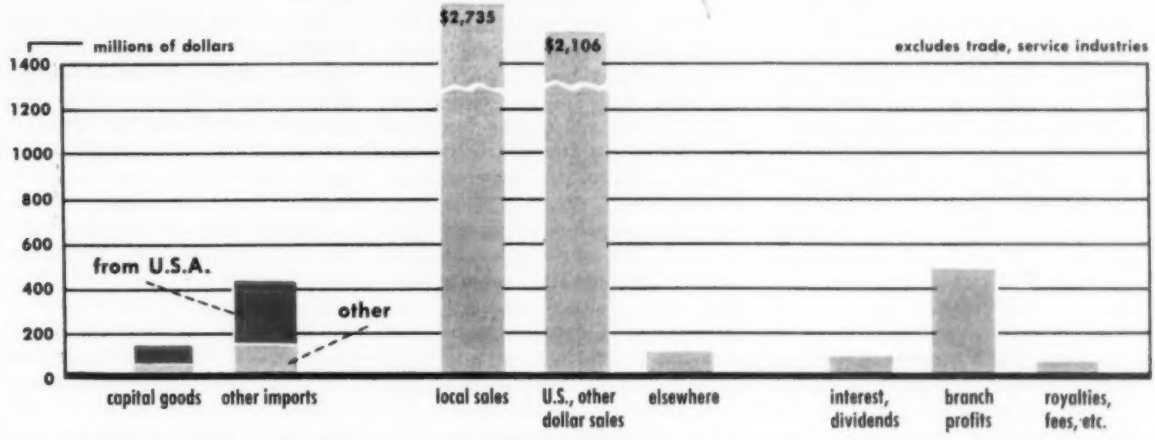
Management Digest

The Impact of Foreign Investment

First of its kind, a new survey reports on the impact of U.S. investment on Latin America's economy. Here are the results:



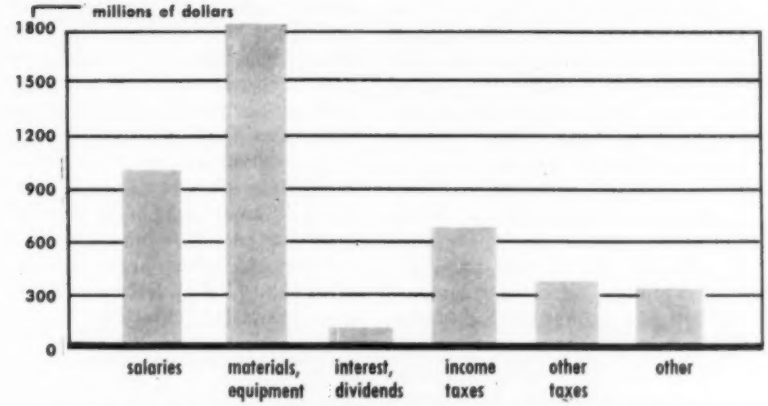
These are 1955 book values of U.S. investments — real values are much higher. With this asset base, U.S. companies in 1955 . . .



. . . imported goods worth $697-million, 10% of area's total . . .

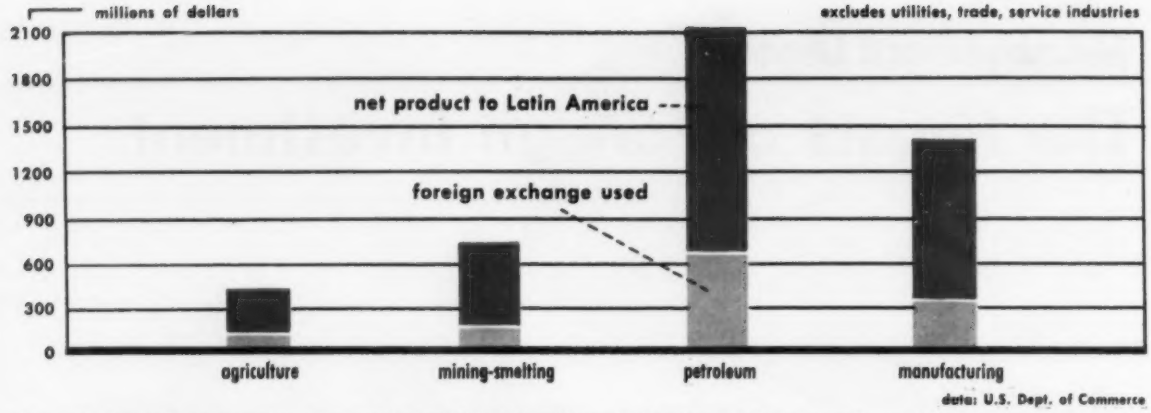
. . . sold $5,000-million, including 30% of all Latin exports . . .

. . . sent home profits, dividends, etc., of about $650-million . . .



. . . and paid out locally $4,300-million for wages, supplies — and taxes amounting to 15% of all Latin government revenues.

To see the effects of these business operations on Latin America's production and balance of payments, turn the page:



Overall, the U.S. companies surveyed used $1,300-million in foreign exchange; subtract that from gross product and capital flows and you have a total net product for Latin America of $3,500-million.

Yankee Business Grows and Grows

Everybody talks about the effects of private foreign investment on developing economies. But few can offer statistical evidence of what those effects may be.

Now, the U.S. government's Dept. of Commerce is completing a pioneering attempt at a better understanding. The area under study is Latin America in 1955; the investors are U.S. corporations. The preliminary results, published in the Commerce Dept.'s *Survey of Current Business*, are summarized in the charts above. They reveal:

—**that North American companies are expanding their Latin American facilities** at an "impressive rate"; that their investment in fixed industrial assets is at least one-tenth of all such investment in the 20 Republics.

—**that their exports account for 30% of the area's total** and create a net, direct foreign exchange return of $1,000-million.

—**that the U.S. operations account for about 5% of Latin America's gross product,** and about 20% of total mining and manufacturing product.

Of course the Commerce Dept. survey is complete only so far as it goes. The figures are conservative, and probably considerably understate total impact.

The researchers gathered their information by questioning U.S. companies with subsidiaries and branch operations in Latin America (those with assets less than $100,000 or where U.S. interest was less than 50%, were excluded). The returns list 1,000 enterprises, about 85% of all the assets employed by U.S. business in Latin America.

There are many statistical "traps" in such a broad study: The figures in the charts do not always add up. In some calculations, public utility, trade and service operations are not included. Lack of fully comparable figures troubled the researchers. And they found, among other things, that the usual method of carrying assets in terms of "book value" understates—perhaps by one half—the real increases in the U.S. corporations' investment.

No one was surprised when the petroleum industry bulked largest. It accounted for 40% of all sales by the companies, and Venezuela turned up the biggest beneficiary of U.S. operations. Yet the survey shows that nearly one half of all their petroleum sales were made within Latin America, supplying much of the energy upon which the continent depends. Statisticians note that the petroleum component would not be so large if refining operations were included under "Manufacturing"—rather than being lumped under "Petroleum."

Of the 609,000 employees of the U.S. companies, only 9,000 were sent from the U.S.A. Employment was fairly evenly distributed: Brazil has 90,000; Argentina, Cuba and Mexico had just over 70,000; Chile, Colombia, Peru, and Venezuela had 30,000 to 45,000.

The survey estimated average output per worker at $5,000—ranging from the oil industry's $22,000 to $6,000 in mining and $3,000 in manufacturing. Average pay per worker was $1,600. And again the spread reached from $4,200 for the oil industry to agriculture's $900 (a low figure because many farm employees do not work full time).

The most significant figure of the survey is the estimate of net product accruing to Latin America. After all foreign exchange costs are subtracted, $3,500-million can be taken as a measure of the goods made available in 1955 by the U.S. companies.

There was no way to measure indirect impact of the foreign investment—health, education, other social activities of companies, plus technological and management innovations. But for all these qualifications, the government researchers have made an important contribution to the study of investment. And they believe that an extension of their coverage to other areas, and to other than U.S. investment, might show a similar impact. ●

Digested from Survey of Current Business, January. Final and complete results of the study will be available in a separate publication.

Exporting Economic Advice

More governments are using foreign financial consultants, men who can change an entire nation's business climate. Who are these men, and how do they work?

Digested from BUSINESS WEEK, Feb 2, p80

There is a new profession in the world, practiced by a small group of men. These men can wield immense influence. Wherever they turn up, businessmen are almost certain to feel the effects in their day-to-day affairs.

The profession is selling advice on broad economic and fiscal matters to governments. The "fiscal doctors" who purvey this advice aim high—their bold recommendations often call for sweeping changes in an entire nation's economic policy. Often this advice is not taken. But sometimes it is.

In mid-1955, Chile was struggling with a desperate inflation. Then the government called in Klein & Saks, economic consultants who were advising neighboring Peru. Soon Chile was attacking inflation with a new "law on the stabilization of prices, wages, and salaries."

Today, Peru boasts a relatively stable economy. And there is new confidence in Chile's ability to restrain inflation. You can make a good case that, in part at least, these results are due to the continuing work of Dr. Julius Klein and Julien M. Saks (cover pictures).

In any case, the Klein-Saks consulting business is bustling. In Guatemala, the firm has been working on budget problems, customs, government organization—and a much broader study is probably coming soon. There is talk that Brazil may be the next nation to retain Klein & Saks.

While Klein & Saks probably ranks as the grand peer in the field of government consulting, the competition is growing. Like Klein & Saks, many consultants prefer headquarters in Washington. One of them, Robert R. Nathan Associates, has been working hard on Burma's development problems. Continental-Allied Corp., which has done a survey for Liberia, is beginning work in India and negotiating with Argentina. There are many others. Though it is primarily an industrial and management consultant, Arthur D. Little Inc. (Cambridge, Mass.) has made economic studies for Puerto Rico, Iraq, Nova Scotia, and Honduras.

Dr. Klein (now in his 70s) saw a great deal of international economic problems as the first chief of the U.S. government's Bureau of Foreign Commerce in 1917. In 1935, he joined with Julien Saks (a financial man with export experience) to set up the firm. At first it concentrated on U.S. corporate clients; now the business is half domestic, half foreign.

After World War II international consulting work came into its own. All kinds of groups—the World Bank, the United Nations, the U.S. State Dept., the aid and reconstruction agencies—entered the business. But instead of eliminating the private consultant, this official activity helped him.

There are many reasons. Reconstruction posed difficult financial policy problems, and so did the faster pace of industrialization around the world. Problems of inflation, of getting loans from governments and international agencies, of using monetary weapons to moderate business swings.

It is a difficult business, but the pay is good. The Klein-Saks operation illustrates:

In mid-1949, Peru agreed to pay Klein & Saks $50,000 for a three-month survey. It soon turned into a major job, a one-year contract followed by renewals every six months. Klein-Saks got $10,000 a month—plus all expenses for a 20-man staff.

After an intensive study, Klein-Saks prescribed drastic medicine: Abolish controls, temporarily increase wages, remove import curbs, liberalize taxation and mining laws to attract foreign investors, and let a free peso seek its own level.

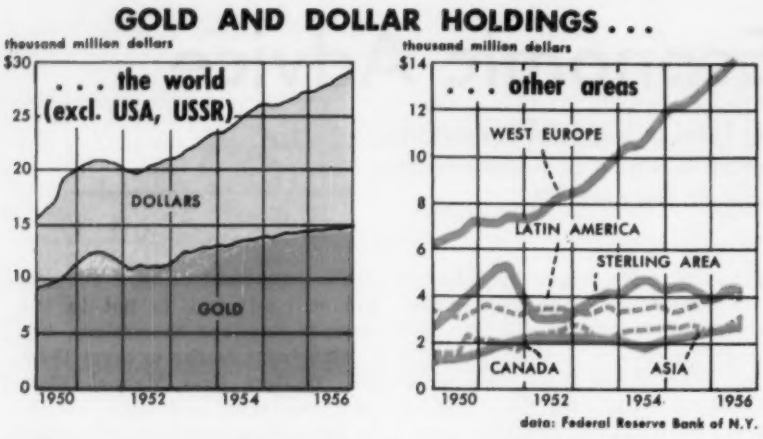
The important thing, a consultant will tell you, is not in the recommendations themselves, but convincing a leader to carry them out. In Peru, Pres. Manuel Odria was convinced, and stuck closely to the advice. Soon the Peruvian peso looked more healthy, and investment took a turn upward. This was partly due to the Korean War boom—but no one denies that Klein and Saks helped a great deal.

In the years since, the Klein-Saks mission's influence may have declined in Peru; many later recommendations have been shelved. Yet despite this, Peru enjoys the reputation of having one of the better diversified, better managed economies in Latin America.

Now the test is under way in Chile. Klein and Saks went there in late 1955 on an eight-month contract (for a reported $310,000), renewed twice since. Pres. Carlos Ibanez moved quickly in parts of the Klein-Saks program—and one result is that during 1956, the rate of the cost-of-living rise in Chile was halved. Lately there have been problems, and some signs that the anti-inflation program is not moving as resolutely as it was. But the story is far from complete.

There are always problems for the consultants. A government knows that if it accepts, say, a World Bank recommendation, a loan may follow. The consultant does not have such influence. A government may blame a consultant for failures—whereas it would hardly blame the World Bank.

But there are advantages. The client pays the consultant for advice, and thus is apt to take more recommendations to heart. The consultant can employ salesmanship that a foreign government official could not use. And, finally, Klein himself says: "When a government comes to us, it knows we are not speaking for Washington." ●



The Gold Story: Higher Reserves, Healthier Trade

Digested from ENGINEERING & MINING JOURNAL, Feb,p76

What happened to gold last year? And what does the 1956 gold story suggest about the trends of trade in the future?

Note these three important developments in the yellow metal:

—World gold output rose for the third consecutive year, due mainly to South African production.

—Official monetary stocks received almost as much new gold as in 1955; the Middle East crisis apparently did not touch off the kind of hoarding that followed the Korean outbreak in 1950.

—Most nations built up their gold and dollar reserves, increasing their international liquidity for the fifth year in a row.

Overall, the gold story tells of stronger economies, and stronger efforts to maintain stability. And that gives hope of a better "economic balance" in the world.

World production of gold (excluding the U.S.S.R., though it is probably the world's second largest producer) was about 28.6-million fine ounces, up 1.1-million oz. from 1955. At the official U.S. price of $35, that is about $1,000-million worth. Output has been rising steadily, but is still 8-million oz. short of 1940's all-time high.

The South Africans are almost wholly responsible for last year's increase—the Union's production has risen 37% since 1951, to almost 16-million oz. The big expansion began in 1953, from rich new mines in the Orange Free State and the Far West Rand. These mines will further expand their output.

Elsewhere—in Canada (second largest non-Communist producer), the U.S.A. (third), Australia, India, Canada, the Philippines, the Congo, the Rhodesias, and Latin America—there were no important changes. Gold mining costs are rising around the world, thanks to labor shortages, declining yields. Quite a few governments are granting subsidies to producers. Even in South Africa, producers are now benefitting from certain tax reductions.

Of last year's new gold, about three-fifths—or $600-million—was added to reserves of governments and international financial institutions. (Just a few years ago, only a third of the new gold went into reserves.) The remaining two-fifths of new gold went to industry, or was absorbed privately.

Private demand in Europe—declining since 1954—was dormant during the first half of 1956. And while it revived after the Suez crisis, the upward movement was slight. More gold was probably absorbed in the Middle East and Asia in 1956—but since the metal is used as a means of payment there, the increase cannot be considered mere hoarding.

Indeed, the Middle East crisis utterly failed to touch off a sustained price boom. Immediately after Egypt seized Suez, there were substantial rises in the Middle East and Far East. But in the West European markets where gold is traded internationally, and in other markets where gold is traded directly for dollars or for local currencies, bar gold prices did not deviate much from the London price. However gold coins —always the most volatile indicators of business sentiment—did have a sharp increase.

There were several new gold trading arrangements: Belgium-Luxembourg and Canada allowed residents to freely buy and sell, export and import, gold; Thailand, Greece, and West Germany eased some import restrictions. Yet none of these measures affected international trade in gold, nor did they seem to increase hoarding.

Monetary gold reserves of governments grew mainly through purchases of newly-mined metal. The U.S. stock rose too, and at year-end stood at $22,058-million, around 57% of the non-Communist world's gold reserve. Also, most nations added to their dollar reserves, official and private. The net addition of $1,700-million was due to the "cash" deficit in the U.S.A.'s balance of payments.

True, the American trade surplus increased as merchandise exports grew faster than imports. But this was more than offset by the U.S.A.'s large net payments abroad for travel and tourism, shipping, private capital investment, and aid spending.

World gold and dollar holdings rose about 8%, and are nearly 50% above March 1952 levels, when general build-up of reserves began. The totals, of course, conceal important changes in individual nations' reserves. Western Europe's reserves increased; but while West Germany was gaining almost $850-million, France lost $220-million. Latin American reserves rose $221-million; but much of it went to Brazil, while Argentina lost gold. The aggregate gold and official and private dollar holdings of the sterling area remained unchanged; but the central gold and official dollar assets held by Britain fell.

These gains and losses of reserves reflect different economic

conditions in various nations. But they also reflect psychological, "confidence" factors. For example sterling has been especially vulnerable to speculation since the Suez crisis. Yet Britain's trade and economic position has been fundamentally sound. The British government has made clear that it intends to defend the pound, and does not intend to reimpose the strict payments controls it had previously removed.

Many other countries are attempting to defend their reserves by curbing inflation, and restoring a balance in their trade and payments. This gives grounds for hope that the advance toward freer and less discriminatory payments—which slowed a bit during 1956—may be resumed this year. Note that even where countries faced difficulties, there were —with few exceptions—no relapse into stringent trade controls.

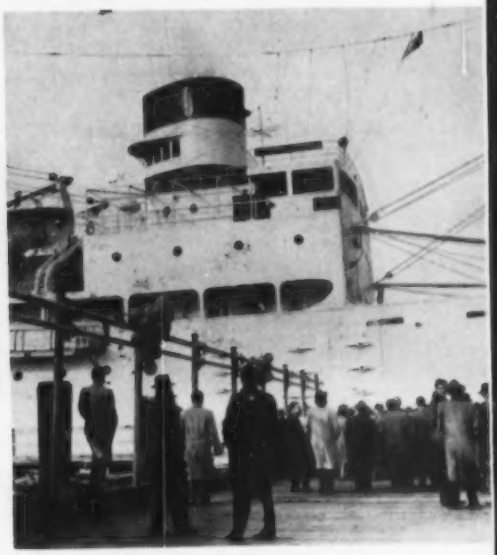
Growing reserves are regarded by U.S. policymakers and economists as a healthy sign of a gradual strengthening of nations' balance of payments. That, in turn, is the result of growing output—and of better financial management. And the economists make this important point:

Of the growing reserves, much has come from new gold production. But a very important part has been earned through transactions with the U.S.A. Most of the dollars that foreign nations have acquired have not been converted into gold, but are being kept in U.S. banks, and invested in U.S. securities. Thus the dollar more and more becomes a currency in which other countries keep their monetary reserves.

You hear some concern in the U.S. about the size of these claims with respect to the U.S. gold position. But the concern ignores this fact: In a world where the dollar has emerged as the leading currency, much of the foreign dollar holdings represents funds needed by foreign banks and businessmen to carry out their trade. Their need for dollar assets has increased as the foreign trade of the U.S.A. has expanded, and as multilateral settlements in dollars have become important even in nondollar trade. ●

Nylon oil "barges" may be an answer to the tanker shortage . . .

. . trucks travel transatlantic . . .



. . fruit juice goes first class.

If It Floats, Why Not Try It?

Expanding trade, canal trouble, more costly cargo-handling are all bringing new ideas to the world's sea lanes.

The nylon petroleum "barge" is just an idea now; the top picture shows models, not the real thing. Two British professors think you can put oil in a bag and tow it more cheaply than you can operate tankers. Their reinforced nylon tubes would be 180-meters long, carry 9,000 tons. Research indicates the tubes could stand the stress of ocean towing—but would require reasonable cooperation from swordfish.

The trailer ferry Carib Queen (left) recently linked the highways of the U.S.A. and France. It can carry 93 loaded truck trailers, 100 autos, 1,000 tons of liquid cargo. The big saving: loading takes just 10 hours, compared to almost three days for a conventional freighter of equal capacity.

The S.S. Tropicana (right) just made a maiden voyage from Florida's orange groves to New York. She can carry up to 5.7-million liters of chilled fresh orange juice in vacuum-sealed stainless steel tanks — at tremendous savings over road transport. The owners think they can vastly increase U.S. consumption of fresh juice—and eventually build markets in Canada and Europe.

Petroleum Week, Feb8; Business Week, Jan26; Wall Street Journal, Feb20.

PEOPLE OF SOUND JUDGEMENT

Daniel F. Bacardí, Vice President of the Compañia "Ron Bacardí" S.A., Santiago de Cuba.

He's great shakes in the rum business!

He is devoted to rum. His vocation is rum. Naturally. He bears the "great name in rum", Bacardí. The rum with the law squarely behind it. Back in 1936 a New York court ruled that a Bacardí cocktail must be made with Bacardí. At that time Daniel Bacardí was more familiar with water: he was in the swimming team of his alma mater, the University of Virginia. But soon he received the call; the century-old Bacardí distilleries needed the Bacardí of the modern generation.

He went the hard way to leadership. He entered the Export Department as a clerk. Salary $45 per month. Authority: none. It worked because he worked. He dashed through sales, came out boss. Now, at 45, he is vice president and Number One in executive echelon. He still likes water. For a change and for fishing, he lives in a spacious mountain lodge in the Sierra Maestra range not too far from his business HQ in Santiago de Cuba. Its 20 bedrooms are none too many for the family and domestic staff; Daniel and his graceful Graciella Bravo de Bacardí have nine children. On hunting trips Daniel flies his own plane, a Hawker named "Rum Customer". But like his product Mr. Bacardí circles the globe. And then it's KLM he uses. For travel by KLM is like Bacardí rum in a cocktail - smooth, effective.. a most enjoyable experience.

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A Better Way to Buy Equipment

EQUIPMENT REPLACEMENT policies are becoming better organized, more formal and scientific.

ECONOMIC ANALYSIS is replacing rule-of-thumb methods as management struggles with the machinery replacement problem.

To buy or not to buy? The old machine seems to be running fairly well. A new machine might not do much better—or it might make a big difference in production. Prices are high, costs are rising, business is expanding. What does management do?

Equipment replacement policy is a difficult matter even in the most stable, non-inflationary business climate. Now, in the U.S.A. and elsewhere, there is a mounting concern with the problem. And there are signs of improved management practice in equipment buying—according to the Machinery & Allied Products Institute (MAPI), an American organization of capital goods producers.

Capital goods management has a double-edged interest in equipment policy. Sound practice is worthwhile for its own sake. And capital goods makers can hardly expect their customers to buy with common sense if they themselves do not.

I. Machinery Management

According to MAPI, one-half of the capital goods producers in the U.S.A. now have a man wholly and specially responsible for studying the economics of replacement. Almost 80% make regular reviews of their equipment. In both cases, the percentages are double what they were in 1948.

Three-fifths of the companies responding to a recent MAPI survey make annual capital budgets. But only a few—perhaps a quarter—make up preliminary budgets for more than a year ahead. One reason is that most machinery producers are small companies, and generally do not do as much formal planning as large firms.

In a majority of companies, recommendations for new equipment come from superintendents, works managers, or department heads; the final decision is usually made by the president or chief executive officer. But 30% say the board of directors or executive committee has the final word. Almost all of the companies keep some sort of records on a machine or facility basis.

An unexpected result of the survey is what one economist called "remarkably little concern over the effect of inflation on the depreciation reserves." (See MD, Sept '56, p 17.) Depreciation policies are intimately tied up with the tax laws of the U.S.—and only 20% of the companies suggested that the laws be reformed with a purchasing-power adjustment. Also, only a bare handful of the companies make any purchasing-power adjustment in their book depreciation accounts, as contrasted to tax accounts, to compensate for rising replacement costs.

Rising costs can play havoc with replacement plans. The controller of the American Pulley Co. recently described how his company met this problem. After the war, this company made an engineering survey of all its equipment, set up a perpetual five-year plan to replace old equipment on an economic basis.

But the company quickly realized that replacement costs were racing far ahead of the original costs and tax depreciation allowances. So American Pulley set up an accrual fund to make up the difference. For instance, the 1956-60 schedule calls for five items to be replaced. The original cost of these items was $11,600; now estimated replacement cost is a towering $46,000 above the original cost—which is the depreciation allowance available under U.S. tax laws. The company calculates the excess replacement cost as a percentage of estimated sales—and credits the income to its reserve account. Also, American Pulley treats the entire replacement cost as a legitimate expense, even though the reserve fund is taxed as profit. The annual report, however, must meet U.S. accounting standards by showing the excess replacement costs as an understatement of profit.

II. Equipment Economics

The most controversial aspect of equipment planning is the economics of replacement. Developing methods to analyse equipment is a popular sport—and management can choose from a variety of simple and complex procedures. They have such labels as "pay-off period," "rate of return on investment," "compound interest," "discounted cash flow," "minimum average cost." Many companies are testing more than one method.

The most popular criterion is a simple pay-off period. In the MAPI survey three quarters of the companies using a pay-off period demand that new equipment, with a service life of 10 years or more, must pay for itself in three to five years.

Rate-of-return on investment—which usually involves the same calculations as a pay-off period—is also a popular method. A return of 20% to 30% on equipment with a service life of 10 years or more is required by most of the companies using this method. A 20% rate of return is the equivalent of a pay-off period of five years. Only 16% of the companies using a pay-off period go beyond five years; but 34% of the companies using rate of return require only 10% to 15% on their investment.

Of course, there is no accepted basis for setting a pay-off period—

should it be 2, 3, 4, 5, or 10 years? Also the same criterion is often applied across the board—from office equipment to machine tools.

Is there any middle ground between rule-of-thumb and complex accounting methods? Yes, says Dr. Roger B. Orensteen, of International Business Machines Corp., writing in *Factory Management and Maintenance*. Orensteen has developed standard "factors" that substitute for most of the estimates required in the complex, but highly recommended, accounting formula developed by MAPI. He recommends his "short-cut" when extreme accuracy is not wanted—say for over-all equipment surveys and quick calculations, or when the equipment analyst cannot provide accurate estimates.

The short-cut method is based on two assumptions:

One, a 10% rate of return is assumed. Orensteen maintains that a four or five point difference in rate of return doesn't have a serious effect on replacement cost comparisons anyway.

Two, a uniform yearly decline in salvage value is assumed. Orensteen has studies to prove that it is surprisingly uniform.

To calculate his factors, Orensteen estimated the service life of 160 types of metalworking equipment, based on MAPI analyses.

To use the table, you need only three estimates: 1) installed cost of proposed equipment, 2) current salvage value of equipment in use—found by surveying the market, and 3) next year's operating cost savings or net operating revenue of the new equipment.

The standard MAPI method is based on comparing something called the "adverse minimum"—calculated by the MAPI formula—of old and new equipment. The new equipment is called the "challenger," old equipment the "defender." The defender should be replaced if the challenger has a lower adverse minimum.

Orensteen's modified method works slightly differently. His factors do not give an "adverse minimum;" instead, they give what he calls "factor costs." The element missing in Orensteen's factor is the estimated cost disadvantage—or savings—of operating the old equipment for another year. So his method simply provides a figure to compare with this estimate.

Here is an example:

A company is considering buying a new grinder to replace an old one. The new grinder costs $18,000 installed; the old machine has a current salvage value of $3,000. The company estimates that the new machine would save $2,800 in operating cost for the year. Should the company replace the old grinder?

Orensteen would do it like this:

—Multiply the new equipment cost by the acquisition factor for grinders (from the MAPI table). The factor cost for the new equipment is $18,000 x 0.173 = $3114.

—Multiply the old equipment salvage value by the replacement factor from the table. The factor cost for the old equipment is $3000 x 0.20 = $600.

—Subtract to find the amount that must be saved if the new machine is to pay off. $3114 − $600 = $2514. Orensteen calls this figure the "required cost savings" for next year.

—Compare the required savings with the estimated operating savings for the year. $2800 is obviously bigger than $2514. Equal figures would reflect the assumed 10% rate of return.

The greater the difference, the greater the operating advantage and return on investment. So the company would do well to replace its old grinder.

This short-cut method can also be used as a guide to buying new equipment for expansion. Just compare the factor cost for the new machine to an estimate of the operating cost of using the machine. Operating costs include out-of-pocket expenses and added overhead, but excludes depreciation. A combination problem—partly replacement and partly expansion—can be handled with a similar approach. ●

Digested from Factory, Jan., p102; "Machinery Procurement and Development," Special Report 14, American Management Assn.; "Equipment Replacement and Depreciation," Machinery & Allied Products Institute; McGraw-Hill Department of Economics.

Should You Buy That New Machine?

Here are "standard factors" that will help you decide whether or not to buy new equipment. Multiply acquisition factor by cost of new equipment, replacement factor by salvage value of old. (See example above.)

Machine Tools	Replacement Factor	Acquisition Factor
Boring Machines	.20	.176
Broaching Machines	.20	.176
Cutoff Sawing and Filing	.23	.200
Cutoff Machines	.21	.186
Drilling Machines	.20	.173
Gear Cutting and Finishing Machines	.18	.164
Grinding Machines	.20	.173
Honing and Lapping	.21	.186
Lathes	.18	.164
Milling Machines	.18	.164
Planers	.15	.143
Pipe Cutting and Threading	.20	.176
Polishing and Buffing	.20	.176
Shapers	.16	.148
Threading (except pipe)	.17	.155
Other Machine Tools	.20	.173
Metal-Forming Machinery		
Bending and Forming Machines	.20	.176
Hydraulic Presses	.21	.182
Pneumatic Presses	.24	.207
Mechanical Presses, Power-Driven	.18	.158
Punching and Shearing Machines	.17	.156
Forging Machinery (except presses)	.15	.143
Swaging Machines	.20	.176
Wire and Strip Forming Machines	.18	.164
Die-Casting Machines	.21	.182
Plastics Molding Machines	.22	.190
Riveting Machines (not portable)	.21	.182
Other Shop Equipment		
Electric Welding Machines	.22	.193
Gas Welding Machines (not hand)	.25	.214
Flame Cutting Machines (not hand)	.22	.193
Balance Machines	.21	.186
Air Compressors	.22	.190
Plating Equipment	.22	.193
Materials-Heating Equipment	.20	.176
Cleaning Equipment	.21	.186
Cutting Fluid Systems (multi-machine)	.23	.200
Crushers, Chip	.20	.176
Cranes, Overhead Traveling	.18	.158
Hoists (including Jib and Rail Mounting)	.23	.200
Industrial Trucks, Power Driven	.25	.214

In Management

● **MORALE of the workers** at Lake & Elliot, a foundry at Barintree, England, rose after electric razors and hair-cream dispensers were installed in the washroom for use at the end of the day. (*Personnel News Letter, Feb* 18)

● **CAN MACHINES CONTROL OUTPUT better than their operators?** Not necessarily, says the British Medical Research Council. Workers were recently tested under two conditions: (1) the worker controlled his own rate of work, and (2) his machine set the rate of work. In the first experiment, it was discovered that the worker—despite gaps in his production—maintained a normal output. When the machine set the rate, however, the worker's production declined. (*Supervisory Management, Feb, p*44)

● **BUSINESS FLYING is booming in Latin America** (MD, Dec p20). In Brazil alone, light planes are owned and operated by 70 companies, and many more are privately registered by executives who use them primarily for business. There are over 2,300 private planes registered in the country. A plantation in Matto Grosso has six planes and 12 private airstrips to cover its hundreds of thousands of acres. The Fontoura-Wyeth pharmaceutical company in Sao Paulo owns six aircraft, including a twin-engine Saab Scandia.

Air taxis are also increasing. Nearly 500 are now registered, compared to nine in 1950. As airline service gets better between major cities, air taxis move deeper into the interior. One pilot, Atlas B. Castanhede, has built 120 landing strips in five years to serve mines and ranches in Rio Branca. (*McGraw-Hill World News*)

● **THREE AMERICAN BUSINESS and industrial service companies are planning European projects.** A center for analyzing business problems with analog computers will be opened in Brussels, Belgium, this summer by Electronic Associates, Inc., Long Branch, N. J. The center will cater to small companies who do not want to buy their own equipment.

The other two are industrial research firms. Arthur D. Little, Inc., Boston, Massachusetts, is headed for Scotland. And the Stanford Research Institute, Menlo Park, California, will operate a two-way exchange of research and industrial information. (*McGraw-Hill World News*)

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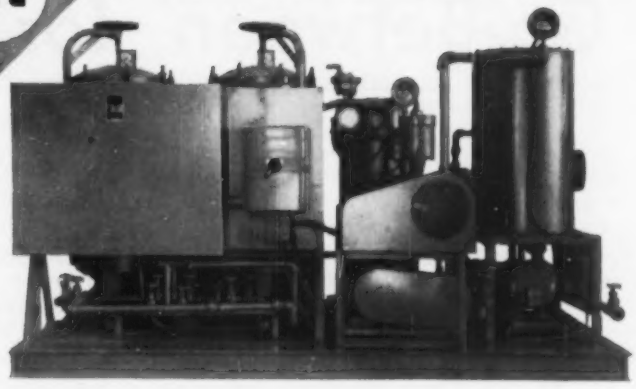

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An inventor (left) shows plans to John Rockett, head of Product Development Corp. Rockett's company evaluates inventions, acting as a . . .

"Go-Between" for New Products

Digested from BUSINESS WEEK, Feb 9, p86

John Rockett understands the needs of the independent inventor. He is one himself, with 50 devices to his credit. He is also president of Product Development Corp., a Boston, Massachusetts (U.S.A.) firm that evaluates new ideas for 12 clients—all of them manufacturers looking for new products.

Rockett says that nearly every major innovation in the last 100 years was the product of an independent inventor. But inventors need help in finding a manufacturer; and manufacturing management needs help in finding new products. Like young lovers, the two usually need a go-between to get together. Rockett formed his company to perform that service—a service that is coming into greater demand everywhere.

The inventor often has the quirks and eccentricities associated with the artist. More often than not, he is fractious and difficult to work with. But he has a certain detachment that helps him dream up ideas, but which also makes him a poor businessman. Filled with enthusiasm for a new idea, he is apt to approach the wrong company, only to be deflated by a disinterested clerk.

Manufacturers, on the other hand, have good reasons for not accepting unsolicited ideas from inventors. Many have found from experience that 99.9% of inventors' schemes—whether patented or not—have no practical value. And there is a legal hazard.

Here is what can happen: A company puts a new product on the market, suddenly finds itself in court with a claim for compensation. And the claimant has a letter he wrote to the company—perhaps many years before—suggesting the idea. Unless the company answered with a signed

APPRAISAL: Removable table legs get practical test . . .

. . . flexible coupling undergoes careful check of engineering details . . .

. . . new type of "accordion" file case is studied by member of the staff . . .

disclaimer to a confidential relationship or a binding agreement, it is possible that courts might uphold the claim for compensation. Furthermore, most companies are not set up to properly evaluate ideas.

The Product Development Corp. takes all unsolicited ideas from its industrial clients, who pay $20,000 a year for the service.

PDC's staff spends its entire time reviewing ideas for new products in the interests of its clients. Between 600 and 1,000 unsolicited ideas come into its offices every week. Ridiculous ideas are discarded in a quick screening. Any idea with even a remote possibility is given a thorough examination by a staff member. If he rejects it, the idea goes to another member—on the theory that no idea looks the same to two men. If either man likes the idea, it passes the preliminary screening.

The screened ideas are then reviewed by a board of three or four men, headed by President Rockett. With their clients' interests in mind, the board evaluates each idea on the basis of need, novelty, and style. Each approved idea is then passed on to the client who might have a potential market for it. The manufacturer makes his own arrangements with the inventor; PDC gets a 1% royalty on the gross sales revenue. There is never any charge to the inventor.

"One good idea," clients say, "more than justifies the cost." ●

. . . and ideas that pass screening (this wall socket, for instance) go to clients.

Saving on Office Expenses

Improvements in methods and procedures can cut the rising cost of paper work and filing.

Digested from WALL STREET JOURNAL, Feb26, p1

"Automation is only a partial answer to the problem of mounting paper work costs," says an official of the American Management Association. When AMA recently made a survey of 138 companies, two-thirds reported that methods improvement, rather than mechanization, was the most successful step their companies had taken to reduce clerical costs.

Companies find a variety of ways to improve methods. Forms are revised to make one do the work of two, three, four, or more. Sometimes, through duplication, one master form may do the work of a dozen.

Age limits are set on filed material. Work flow through offices is simplified. And centralized record keeping may eliminate branch functions.

Methods improvements often come as a result of an analysis to determine if computers are feasible in the company. Many large companies are spending $200,000 to $750,000 solely to study the feasibility of using giant electric "brains." Often these studies show that a giant computer is not needed. And "it is almost universal to find that the greatest saving is in the improvement of procedures rather than in the benefits that the machine brings," an office-procedure expert maintains.

In analyzing its operations, Minneapolis-Honeywell Regulator Co., Minneapolis, Minnesota (U.S.A.), figured out a way to simplify the maintenance of raw material records, cutting $1,000 a year from costs. Elimination of unnecessary data on production reports saved another $298 annually. Conversion of production scheduling to punched cards methods reduced costs by $3,060 a year. Other types of paper work savings built up the total to $117,000 a year.

When companies subsequently introduce automatic devices they thus may obtain a double bonus in work speedup, from the procedure revision and form the automation.

Other companies are cutting costs by setting up standards for office work. Here is what one industrial engineer says:

"Measuring computations for a company financial statement is much more difficult than calculating the production of a punch press operation," says William Brush of Atlantic Refining Co., Philadelphia, Pennsylvania, U.S.A.

Atlantic now has work standards set up for a broad range of jobs, from tabulating operators to payroll calculators and from stock records keepers to typists. Measurement may range from a simple count of the pieces of paper handled by a clerk to a more complex measurement based on a time study.

"Atlantic is realizing cost reduction substantially in excess of each dollar put into the work measurement program," says the industrial engineer.

File modernization is another successful approach. In these programs companies usually establish set filing limits for various pieces of paper. Ordinary letters and messages may be marked for storage of only three months in files. Sales and earnings data may be marked for the number of years required by laws. The approximate 2% of records which fall into the "historical" class may be shunted into permanent files.

An analysis of records at Campbell Soup Co. of Camden, New Jersey, U.S.A., showed that 44% of records in files could be destroyed, with 34% removed to a records storage center and only 22% left in the active file in the office. A similar analysis at Richfield Oil Co. of Los Angeles, California, showed that 39% of records could be destroyed, 36% moved to less costly storage, with only 25% considered necessary for active files. ●

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A share of the profits will encourage these workers to produce 40% to 100% more. But management must accept profit sharing as a philosophy, not just as a handy technique.

Profit Shares: Each Worker a Capitalist

The records show that 60% of all company profit-sharing plans started in the U.S.A. have failed. But where they do work, they seem to work well. Management wonders why.

First, recognize that the profit-sharing idea is full of paradoxes. Some businessmen dislike it because it seems like paternalism, or "socialism." Others like it for just those reasons. And there are management men who insist that profit sharing is the essence of capitalism—because it makes every worker a capitalist.

Few business organizations are as willing to disseminate information and assistance as the Council of Profit Sharing Industries in the U.S.A. As one member says: "We have become not only converts of profit sharing, but evangelists as well."

James Lincoln, president of Lincoln Electric Company, Cleveland, Ohio (U.S.A.), and a founder of the Council, has laid down the one basic reason why some plans fail, others succeed: "Do the people in the organization from top to bottom want to make the plan succeed? If they do, you can't stop them; if they do not, whatever the plan is, it will not be much good."

Of all the success stories, Lincoln Electric is the most often cited. Lincoln's plan was started in 1933. In 20 years, worker productivity increased seven times, take-home pay four times; dividends have tripled, the number of employees increased four times, earned surplus doubled, and prices to customers have been cut in half (while prices in general were doubling). In 1955, Lincoln employees were reported to have received in wages and profit shares an average of over $8,000—twice the average compensation paid by other leading U.S. corporations.

Lincoln's plan is not the only reason for its growth, of course. But other profit-sharing companies are quick to point out that no other incentive fully explains such performance. In fact, the Council claims that "commonly reported" results of profit sharing include a 40% to 100% increase in production per employee, with a sharp reduction in employee turnover, absenteeism, grievances, strikes.

Advocates warn, however, that it is not enough for management to start profit sharing just to reap these rewards. As one put it, there must be "positive acceptance by management that profit sharing is right and proper because the employees helped to earn those profits." The Council says that a "desire for team spirit" is the only motive.

Five steps are recommended for starting a profit-sharing plan:

1. **Investigate working plans,** administration, and performance.
2. **Select a plan** that is suited to the company's operations.
3. **Present the plan** to the board of directors, stockholders, and employees. Everyone must understand.
4. **Revise the plan** in the light of discussions, suggestions, and the advice of lawyers and accountants.
5. **Make the formal announcement** with "all the importance it deserves." A letter from the president, booklets, company banquets are typical methods.

Once administration is underway, the job is just beginning. Since profit sharing has become a basic policy of the company, it should be easy to talk about it at every opportunity. Encourage questions.

A usual question is "What happens if there are no profits?" First of all, you should be prepared with a careful study of the financial structure of the company and its prospects for future earnings. It is probably a bad idea to start profit sharing during an unprofitable period. But continual high profits are not essential to a successful plan. In fact, some say a lean year—preferably after several good years—will give a more complete understanding of the plan. Profit sharing means just that, they say.

Also, they point out, a plan will fail if it is used to supplement a substandard wage. Neither should it be used to replace fringe benefits standard to an industry.

There are two basic kinds of profit-sharing schemes: cash distribution and deferred payments. Many small firms cannot afford separate funds for pensions, severance pay, group insurance plans, etc. In such cases, a deferred-payments fund might be the only way to provide these benefits. Pension trusts are usually set up by U.S. companies, and they are rigidly controlled by a variety of laws. The advice of a lawyer is essential in this area. However, it is well to note that older workers naturally appreciate pension plans more than younger workers. And it takes five years or so for enough balance to accumulate to make the plan impressive.

Some companies prefer a split

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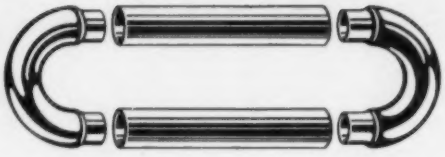

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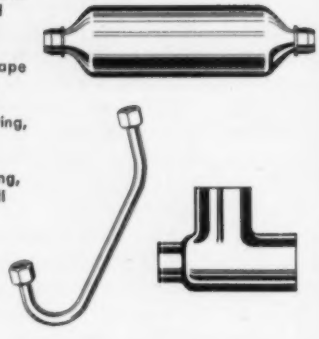

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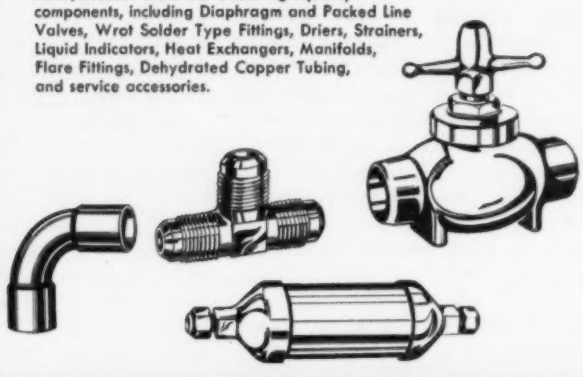

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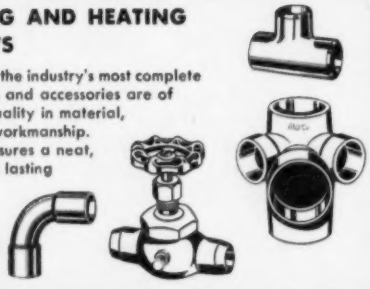

PLASTIC PIPE AND FITTINGS

Rugged Streamline polyethylene plastic pipe and all types of fittings, both copper and plastic, are excellent for a variety of jobs where the flexibility of plastic is needed.

203

40 OUR 40TH YEAR MUELLER BRASS CO. 1917-1957

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plan. Specified percentages go into cash distribution, into a reserve fund, and with a pension fund.

A cash plan, it is agreed, gives a quick, tangible evidence of achievement. Some profit-sharing companies emphasize that it also gives the employee a free choice to use his share of the profit any way he sees fit—to make house payments, buy luxuries, raise his standard of living. But free choice—without a pension plan—doesn't necessarily prevent bitterness toward the company at retirement.

How profits are split and when they are distributed are strictly questions of company policy. Many companies use a single year-end distribution.

There is more agreement that the allocation should be predetermined and fixed. But again, the percentage of profits distributed varies widely from company to company. Profit sharing companies say only that an inadequate share of the profits will kill a plan.

A typical plan is to set up profit levels that call for a specified split. For instance, one small engineering firm does it this way: up to $20,000—nothing; $20,000 to $30,000—15%; and progressively to the $100,000 level, where a 50% split goes into effect. Such levels depend on the company's size.

This engineering company uses a point scale classification to find each employee's share—3 for clerical help, 6 for assistant engineer, 10 for chief draftsman, etc.—plus a multiplier for years of service—1.0 for one year, 1.2 for two, 1.5 for three, and up to 3.0 for five years.

All companies, it appears, use some sort of service-salary relationship. Also, a qualifying period is necessary for all known plans. This period varies from a couple of weeks to years.

However the distribution is set up, profit sharers say the best-laid plans will fail if the management of the company doesn't genuinely believe in the philosophy of profit sharing. ●

Digested from The Controller (Jan, p14), Industrial Distribution (Jan, p91), and the Revised Profit Sharing Manual of the Council of Profit Sharing Industries (U.S.A.).

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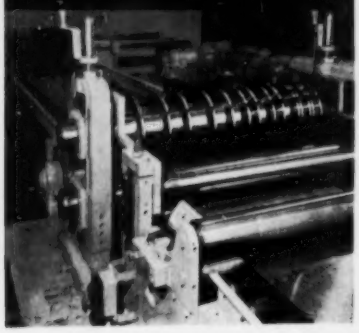
YODER SLITTING LINES



PAY BIG DIVIDENDS WORKING ONLY ONE DAY PER WEEK!

In one plant, two Yoder tube mills and about 50 punch presses are being supplied with slit strands by one Yoder Slitting Line operated an average of only *seven hours per week.*

In another plant, a Yoder slitting line, *operated from six to eight hours per week,* is supplying two intermittently operated roll forming machines with total requirements averaging 100,000 feet per week.

These typical examples demonstrate, first, the big potential output of a relatively small, inexpensive Yoder standardized Slitting Line and, secondly, its big profitability. Assume production of only 35 tons of slit strands per 8 hour shift, one day per week, and the total per year would be 1750 tons. Estimating the saving in slitting cost at only one-half cent per lb., the total annual saving would be $17,500.00.

Besides the big convenience of doing your own slitting, such savings will often repay the investment in a few months.

The Yoder Slitter Book **is a comprehensive treatise on slitter operation and economics, with time studies, cost analyses and other useful data. It is yours for the asking.**

THE YODER COMPANY
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ENGINEERING YODER MANUFACTURING SLITTING LINES

▶ YOU AND YOUR PERSONAL AFFAIRS

Logic has been an academic pastime of philosophers since the Greeks. But there has been a sad lack in helping the layman avoid logical fallacies. Perhaps the biggest barrier to progess is that many people prefer simply to "win" arguments. Straight thinking results in understanding and communication.

Jokes and riddles provide some of the best examples of fallacious reasoning. A man, accompanied by a friend, wants to pay for a purchase with a check. "Who can identify you?" asks the shopkeeper. "My friend here," answers the man. "But I don't know your friend." "That is no trouble. I'll introduce you."

This illustration is from a new book called *Guides to Straight Thinking* (Harper & Brothers; New York, New York; $3.50). The author, Stuart Chase, describes the major fallacies that plague everyday arguments. Any businessman concerned with communication problems should study them carefully.

In great popularity today is clinching an argument by saying that "statistics prove it." This is a variation of the appeal to authority—on the theory that wise men cannot be wrong. Another variation is the self-evident truth—"everybody knows it is true."

And if event **B** comes after event **A**, can it be assumed that **B** is a result of **A**? It often is. This cause-and-effect fallacy has a companion in the false analogy. This situation, it is argued, is exactly like that situation. But is it?

Fallacious thinking can also head in the other direction. An issue is forced into just two sides—black and white with no shades of gray.

Some fuzzy thinkers depend heavily on overgeneralizations. They jump to conclusions from one or two cases. A similar fallacy is the unwarranted prediction: If **this** is done, then **that** (usually dire) will follow. Parents are fond of using this one.

If all other fallacies fail, the fuzzy thinker can forsake the issue to attack the character of its defender. Or "You are another." My point may be bad but yours is just as bad, so that makes everything fine. And a well-known attack is guilt by association—a spurious identification between two dissimilar persons or events.

●

Slowly, but surely, heart disease is beginning to yield to research findings. According to one eminent specialist, within five years doctors should be able to point to a likely candidate for heart disease—and tell him how to avoid it.

Real gains have already been made in the prevention and treatment of certain types of heart disease—rheumatic fever, infection of the heart valves, and high blood pressure.

Diet factors may hold the key to hardening of the arteries (arteriosclerosis). Consumption of certain fats shows a positive correlation with heart disease rates in many parts of the world. And it is known that fat builds up a substance called cholesterol in the blood.

But remember that heart disease is not necessarily fatal. One large industrial corporation reports that 70% of its acute heart cases return to work.

Can I. D. P. save your company money?

YOU'LL FIND THE PROFITABLE ANSWERS IN THIS FREE BOOK

Automation of your office can start with this free book. It tells you what Integrated Data Processing is, how simply it can be applied to your business, how little it will cost you, how to start and where to start your program.

It tells you how DITTO gives you Integrated Data Processing in its simplest and most inexpensive form. Regardless of whether you are concerned with processing of data within a single department, between departments, or throughout the branches and plants of a nation-wide organization, this book is a guide to money saving and increased efficiency for you.

Below are representative examples of companies like your own which are already enjoying the benefits of DITTO Integrated Data Processing:

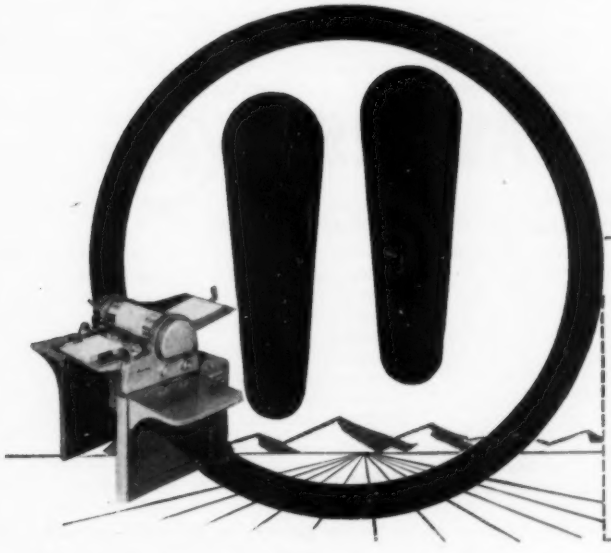
***How DITTO I. D. P. saves money:**

ORDER-INVOICE. **Rubber Goods** manufacturer saves $27,000 a year

PRODUCTION **Hardware** manufacturer saves $24,000 a year

PURCHASE-RECEIVING **Military Aircraft** manufacturer saves $50,000 annually

PAYROLL **Construction Engineering** company saves $30,000 annually



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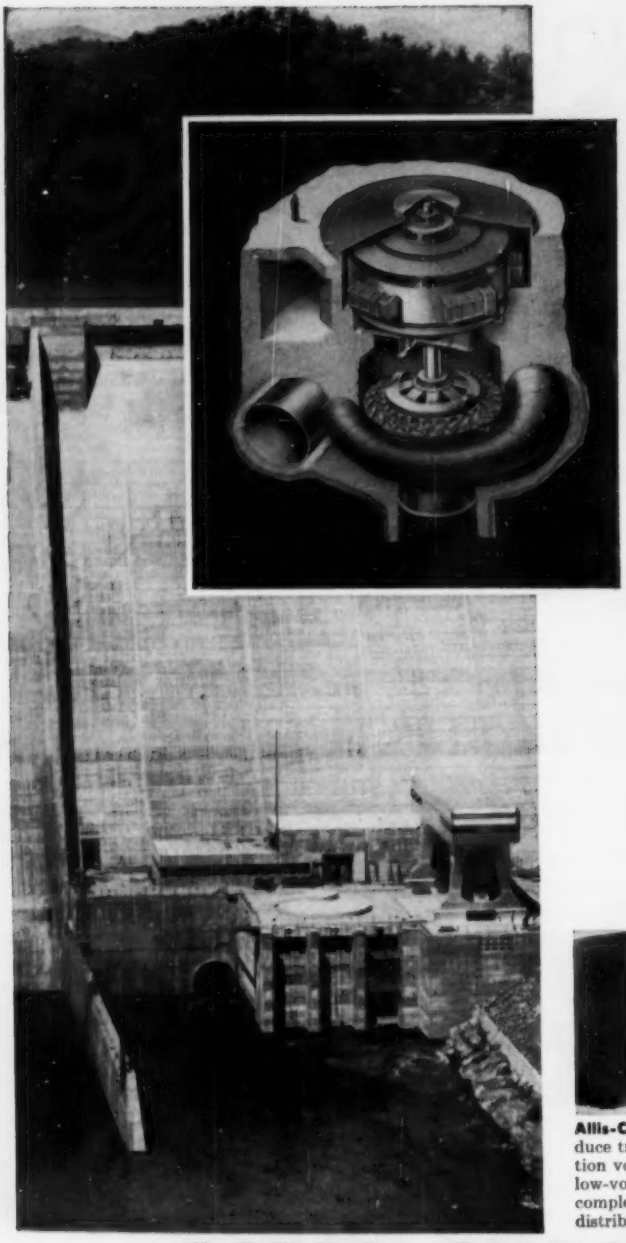
  - ☐ Payroll
  - ☐ Inventory
  - ☐ Other

Name, Position_____

Company_____

Address_____

City_____ County_____ State_____



World's Largest Reversible Pump-Turbine!

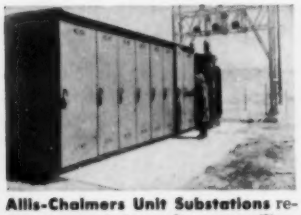
How Allis-Chalmers serves the Electric Power Industry . . . as it serves All Industries!

DURING peak demand periods, this huge 120,000-hp turbine generates tremendous amounts of power. When demand drops off, the unit is reversed. Utilizing surplus off-peak power from other plants in the system, it operates as a 102,000-hp pumping unit to restore water to the reservoir for re-use during subsequent peak loads.

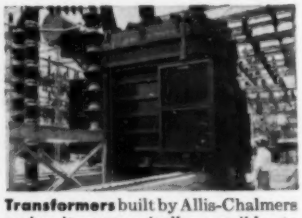
Allis-Chalmers pioneered this remarkable development in the hydro-electric field—just as Allis-Chalmers has contributed pioneering spirit, engineering experience and manufacturing ability to the development of steam turbine generating equipment.

You can look to Allis-Chalmers as a single responsible source of basic machinery for all industries—including necessary components to complete your installation.

You can have Allis-Chalmers experience and engineering cooperation applied to your problems—big or little . . . for *any* industry. Just contact your local Allis-Chalmers distributor or write Allis-Chalmers, Industries Group, Export Department, Milwaukee 1, Wisconsin, U. S. A.



Allis-Chalmers Unit Substations reduce transmission voltage to utilization voltage . . . control and protect low-voltage circuits. A-C builds a complete line of indoor and outdoor distribution equipment.



Transformers built by Allis-Chalmers make it economically possible to transmit power long distances. Allis-Chalmers also makes a complete line of power generation and distribution equipment.

ALLIS-CHALMERS

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Products of the Allis-Chalmers Industrial, Electric Power and General Products Divisions are distributed by firms in these cities. Distributors of Tractor Division products also are located in principal cities.

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BELGIUM—Brussels.
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BRAZIL—Rio de Janeiro, São Paulo, Recife (Pernambuco), Porto Alegre.
BRITISH BORNEO—Sandakan, Jesselton.
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CANADA—Montreal.
CHILE—Santiago.
COLOMBIA—Barranquilla, Bogotá, Medellín, Cali.
COSTA RICA—San José.
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HAWAII—Honolulu, Hilo.
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MEXICO—Guadalajara, Mexico City, Monterrey.
NETHERLANDS—Amsterdam.
NEW ZEALAND—Wellington, Auckland.
NICARAGUA—Managua.
NORWAY—Oslo.
PAKISTAN—Karachi.
PANAMA—Panamá City.
PARAGUAY—Asunción.
PERU—Lima.
PORTUGAL—Lisbon.
PUERTO RICO—Ponce, San Juan.
REPUBLIC OF INDONESIA—Djakarta, Surabaja, Medan, Palembang, Bandoeng, Semarang, Makassar.
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SWEDEN—Stockholm.
TAIWAN—(FORMOSA)—Taipei.
TANGANYIKA—Dar es Salaam.
THAILAND—Bangkok.
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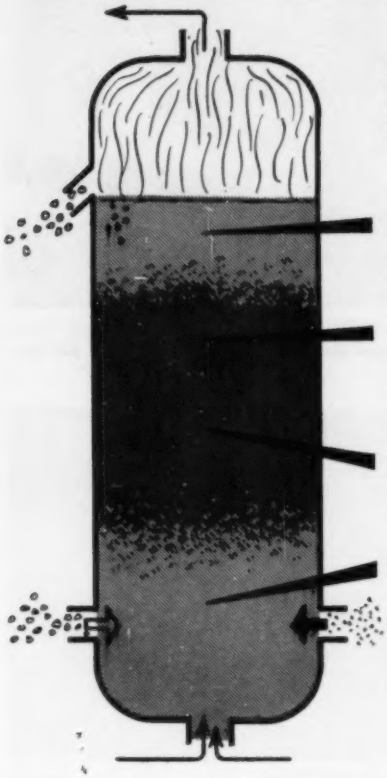
TURKEY—Istanbul.
VENEZUELA—Caracas

ALLIS-CHALMERS MANUFACTURING COMPANY, Industries Group, Export Department, Milwaukee 1, Wisconsin, U.S.A. Factories in U.S.A., England and Canada.



New fluid-bed cement process breaks with tradition. It has these properties:

1 **Uniform size and quality of clinker facilitates product grinding, reduces power requirements.**

2 **Cement reaction goes to completion, produces maximum of high-strength ingredient and minimum of free lime in product.**

3 **Fluid-bed temperature remains constant, permits precise, automatic control of cement reaction.**

4 **Instantaneous reaction of raw materials prevents free-alkali-induced slagging and formation of troublesome dust.**

Fluidized Solids: Better Way to Make Cement?

Digested from CHEMICAL WEEK, Feb. 16, p108

Ever since petroleum producers perfected fluid-bed processing techniques for cracking crude oil, engineers have tried to adapt other types of reactions to fluidization. Steelmen, for instance, have high hopes for a fluidized-bed process that reduces iron ore with hydrogen (MD, June '56). Now the time-honored method of making cement in a kiln may have a competitor.

The Fuller Co. (Catasauqua, Pa., U.S.A.) is currently developing a cement process, invented by chemist Robert Pyzel, based on a fluidized-solids reaction. It does away with the kiln. The company has already finished preliminary testing of the process, is now readying a second, larger (though still not commercial) reactor to study the operation more closely. A Fuller engineer reports: "We have crossed the chemical engineering phase, still have to pass the mechanical stage."

Here's what happens in a fluidized-solids system: Powdered solids inside a closed vessel are kept in continuous motion and intimate contact by bubbling a gas up through the solids. The powdered solids behave somewhat like a liquid during the process. In crude-oil cracking, the powdered solid is a catalyst; the gas is vaporized crude oil. Action of the catalyst breaks down the crude oil, but the catalyst itself does not take part in the reaction. It starts, and keeps, the reaction going.

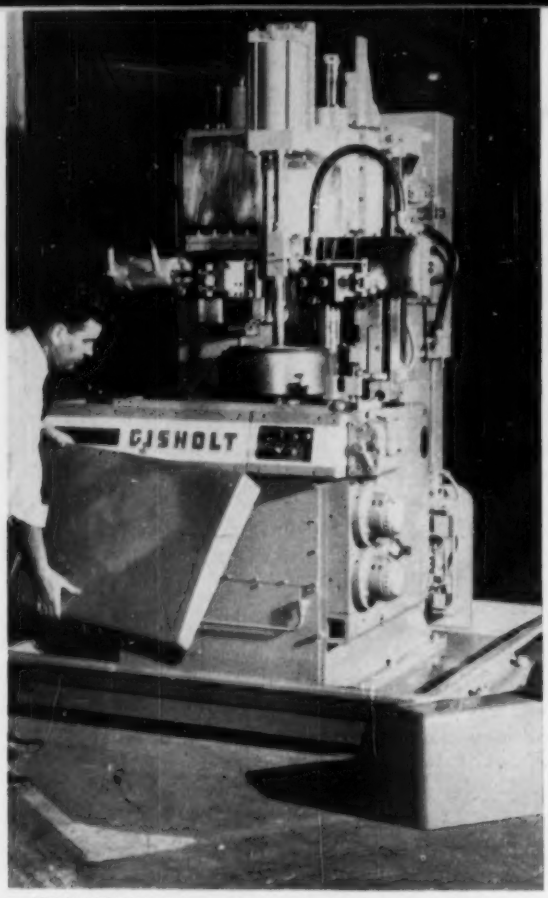
Pyzel's cement process departs from crude-oil cracking. It is unique—the only fluidized reaction where solids react with solids. Here's how it works:

Powdered raw material (typical feed used in conventional cement kilns) is fed in at the bottom of the reactor vessel (see illustration left) into a fluidized bed of coarse clinker particles. Fuel (oil is used in the pilot plant, but gas and powdered coal are also suitable) is introduced into the bed, and burns with the fluidizing air to produce the cement reaction temperature. The powdered feed reacts almost instantaneously to form clinker product—that can be ground into cement. Beyond that, Fuller is reluctant to talk about other details of the operation at this time.

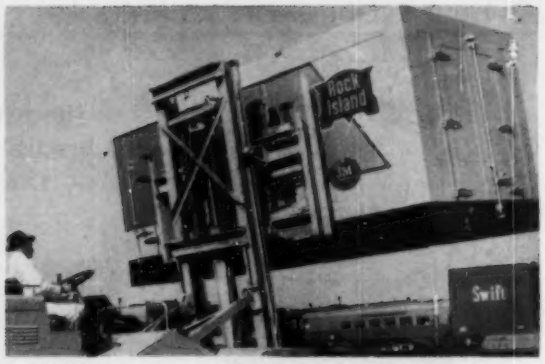
Though the Pyzel process has already shown promise, Fuller is proceeding with caution. Product from the first test reactor proved that the fluid bed could turn out cement with no alkali, low free lime content, and apparently with easy grindability compared with the kiln clinker. The last characteristic is especially important. Most of the power used in cement-making goes into grinding feed materials and product. And because the fluid-bed product is of uniform size and hardness, says Pyzel, it may reduce grinding power requirements to one-half or one-third that needed in conventional plants today.

The second pilot unit is expected to determine optimum fuel ratios, and suggest capital investment and operating costs of large-scale installations. Pyzel estimates that the fluidized reactor will operate at a heat input of about 0.7-million Btu./barrel of cement. That compares favorably with the most efficient modern kilns (0.8-million Btu./barrel), considerably better than the industry average of 1.3-million Btu./barrel.

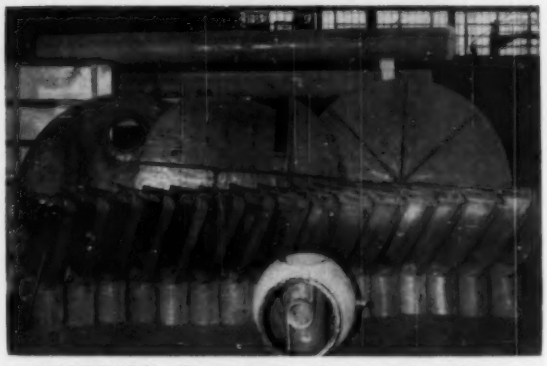
Despite its promising early showing, the Pyzel process is still a long way from its goal. Fluid-bed reactions can be formidable to engineer. And even if, as Fuller claims, the chemical engineering problems have been conquered, the mechanical scale-up job that lies ahead may be much more difficult than expected. But if the process lives up to the Fuller company's hopes, it could become a tough competitor for the large 90-meter to 120-meter-long kilns. ●



1. HOUSINGS—Five reinforced-plastic panels house motors on this Gisholt lathe. Panels save weight and cost.



2. MATERIALS HANDLING—This refrigerated cargo unit has reinforced-plastic skins, gains higher payload.



3. DUCTWORK—Fume hoods, ducts, and tank covers are strong, lightweight, and resistant to corrosive fumes.

New Savings with Reinforced

Digested from FACTORY MANAGEMENT & MAINTENANCE, Feb, p84

Combine glass fiber with polyester plastic and you have the most promising, and perhaps the most versatile, material to appear on the industrial scene in some time. The two together are called reinforced plastics. Few materials can boast the same combination of high strength, low weight, dimensional stability, weather resistance, permanent colorability, and electrical properties. These are some applications:

—**As a direct aid in production:** In tooling, for instance, reinforced plastics are cutting costs and time in half.

—**As key equipment or integral parts:** from big, two-story, fume scrubbers to tiny electrical components.

—**As materials for a product:** from perambulators to coffins, with hundreds of stops in between.

Around the world, you will see these plastics moving into industry fast. Here, and in the pictures above, are examples of how industry can use reinforced plastics now:

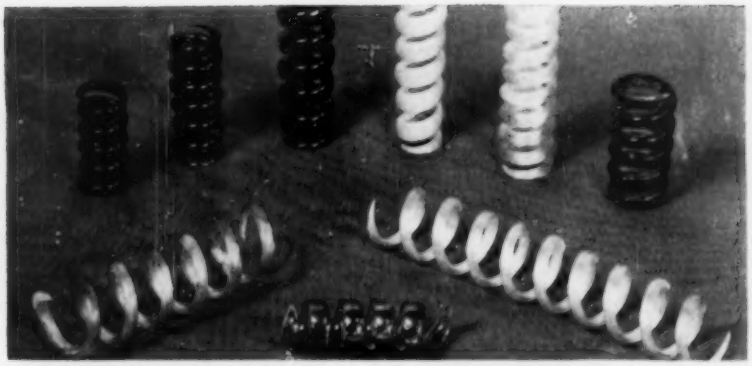
1. **Housings**—Because these reinforced plastics dampen sound, are lighter and vibrate less than most metals, you can use them to replace heavy metal housings on machinery and equipment. And because they are formed ready-to-use with no finishing, their cost is nearly half that of equivalent metal parts.

2. **Materials Handling** — Many kinds of truck bodies and cargo carriers can be built up of reinforced plastics. Sandwich-type panel construction is used. Panels consist of an inner and outer face of reinforced plastics and a core made up of foamed plastics, honeycomb material or balsa wood. Insulation value is high and the structure resists rot, weather and hard usage. Tote and storage boxes, conveyor buckets, pallets are other materials-handling applications.

3. **Ductwork** — Reinforced plastics can carry off corrosive waste gases and liquids without being damaged. Plastic pickling tanks can withstand sulfuric acid and hydrochloric acid.

4. **Machine Parts** — Mass-produced electrical components such as junction boxes are going into more and more machines. Costs are about the same as for metals, and other plastics, but reinforced-plastics offer better electrical qualities. And they are considered flame-resistant.

5. **Skylights**—Because they need no maintenance, do not shatter,



4. MACHINE PARTS: Springs show versatility of reinforced plastics. Epoxy-glass springs are non-magnetic, have low thermal conductivity.

5. SKYLIGHTS—Corrugated glass fiber and plastic panels replaced cracked and broken glass skylights. Material is easily worked. Maintenance is low.

Plastics

and are translucent, reinforced plastics serve as skylights, side panels, and office partitions.

Reinforced plastics can cut repair costs as much as 70%, compared with conventional patching methods. You can fix rusted and dented metal surfaces as well as damaged reinforced-plastics plant equipment. All that's needed is a repair kit containing epoxy resin and glass fiber.

Another growing use for reinforced plastics is in production-tooling for press and drop-hammer dies and other sheet-metal forming tools. It is already saving U. S. industry an estimated $70-million a year. And *Business* magazine reports growing acceptance of the technique in England, too. For instance, a metallized plastic punch and die have been used to make an Austin automobile brake housing. The plastic tool made 27,000 pressings, while a carbon-steel punch and die set reached its limit at 20,000.

Reinforced-plastics tools can be made right in your own shop, at room temperature, and without applying pressure:

Start with a waxed model. Apply a layer of epoxy compound. Follow up with alternate layers of glass cloth and epoxy, finishing with structural reinforcements of the same material. After curing, the model is removed from the mold and is ready for use.

Despite encouraging outlook for reinforced plastic they do have these drawbacks:

—They are expensive.

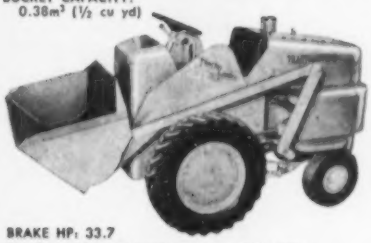
—They are non-corrosive under most atmospheric conditions. But constantly driving rain can erode some surfaces.

—Reinforced plastics are prone to surface imperfections, and require some re-work.

Even so, the advantages outweight the drawbacks, and management may profit by studying reinforced plastics before it makes any decisions on materials. ●

TRY THIS FOR SIZE IN TIGHT QUARTERS

BUCKET CAPACITY: 0.38m³ (½ cu yd)



BRAKE HP: 33.7
SPEEDS: 2 forward; up to 16 kmph (10 mph)
2 reverse; up to 32 kmph (20 mph)
WEIGHT: 2,765 kg (6,100 lb)

compact
TRACTOMOTIVE TL-6 TRACTOLOADER®
is a high producer in confined areas

NO RUNNING ROOM NEEDED TO LOAD

Scooping action of tip-back bucket plus smooth crowding action of hydraulic torque converter drive enables you to get a heaping load of bulk material by just easing bucket into pile — no ramming. No gear shifting, either — you just pull or push a lever to go forward or reverse.

TRAVELS THROUGH NARROW AISLES AND DOORWAYS

Over-all length is only 2.92m (9 ft, 7 in); width, 1.34m (4 ft, 5 in); height, 1.62m (5 ft, 4 in). And loads are carried low, in a level position, with 50-degree tip back of bucket — means less spillage, greater stability, better visibility and easier maneuvering.

MAKES HAIRPIN TURNS AROUND COLUMNS AND POSTS

TL-6 keeps travel time down because it makes right-angle turns around columns and posts. No lost time maneuvering around, either—there is a short, 1.98m (6½ ft) turning radius. And the operator's job is made easy with Power Steering—now standard equipment!

Ask your ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER to show you the TL-6 or the four larger Tracto-Loaders in action. Send for free catalog.

TRACTOMOTIVE
Tractomotive Corporation
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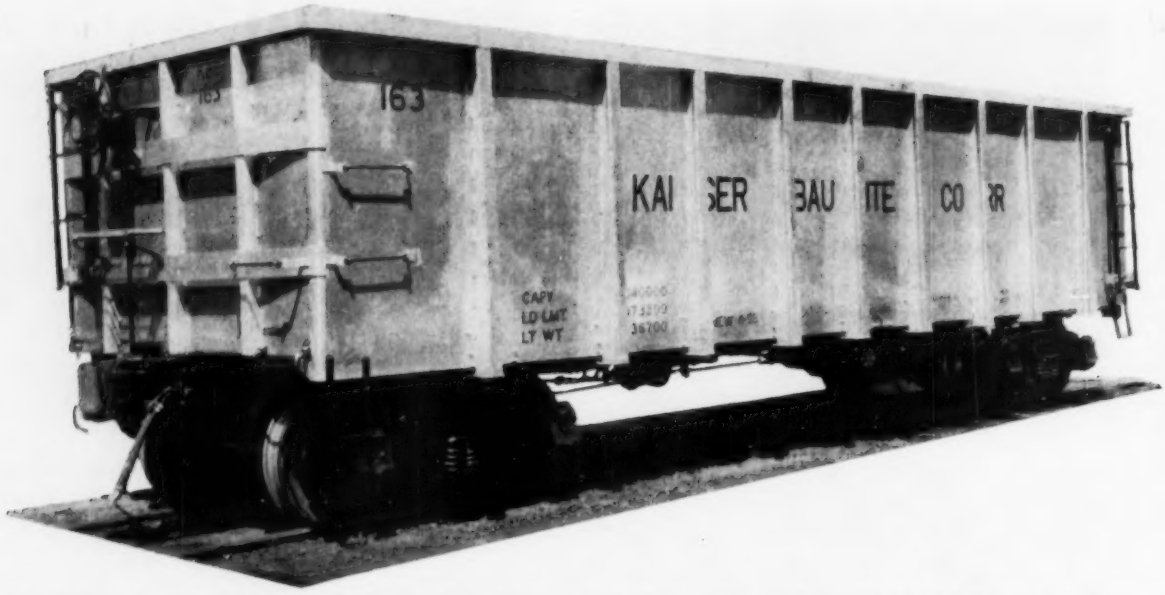
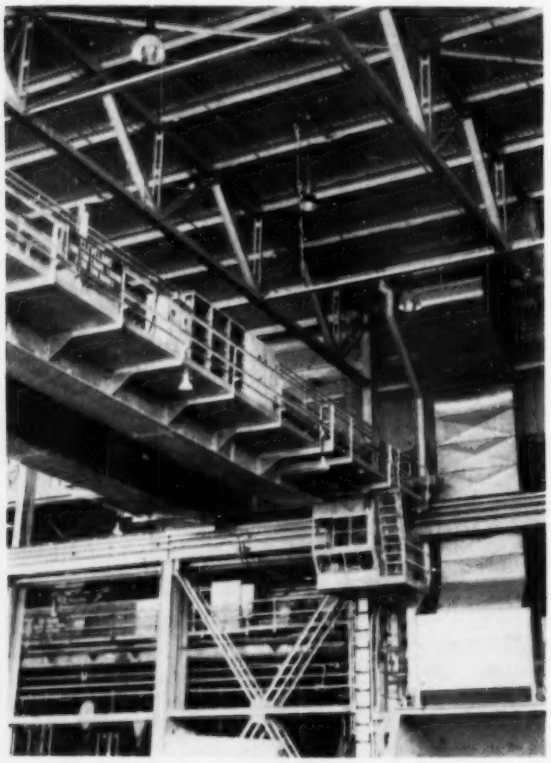


ALUMINUM in this railway car raises payload over conventional steel construction. Inert-gas arc welding joined car body plates and extruded shapes; rivets were only used where the body joins the steel underframe. Aluminum resists corrosion without painting, abrasion, and severe structural strains when car is overturned to dump load.

Getting More Out of Aluminum

Digested from PRODUCT ENGINEERING, Feb, p155; WELDING ENGINEER, Feb, pp27, 44



ALL-ALUMINUM CRANE is light and fast-moving. Welding made a crane girder that weighs 60% less than a steel girder. Welding costs were equal to those for steel.

Welding of aluminum is becoming an important structural technique. Note these three new products:

Kaiser Aluminum & Chemical Co. in the U.S.A. has put together welded-aluminum gondola railway cars and mill-type cranes (pictures). In Australia, Alemco Ltd., Brisbane, turns out 15-ton capacity highway semi-trailers. All three use inert-gas shielded electric-arc welding methods.

Kaiser's gondola is made of aluminum plates welded to extruded shapes. The underframe is standard and made of steel. But the car carries a 20% heavier payload than its all-steel predecessor. The cars haul bauxite from a mining area in Jamaica, B.W.I., to ships.

The aluminum cranes range from 5 tons to 125 tons capacity, and from 18 meters to 31 meters in span. They are used for a wide variety of materials-handling tasks. Kaiser claims these benefits: (1) higher capacity with the same power input, (2) less maintenance, (3) lower erection, installation, and shipping costs. The advantages, says Kaiser, outweigh the fact that kilogram-for-kilogram, aluminum costs more than steel. The cranes will be used in the company's new rolling mill at Ravenswood, West Virginia, U.S.A.

One reason for Alemco's choice of aluminum for trailer bodies is the tax on vehicle weight. Welded aluminum construction weighs less than steel and permits higher payloads. Besides trailers, Alemco makes mine skips and platform trucks, both made of welded aluminum. ●

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A Closer Look at Shale Oil

Digested fom PETROLEUM PRESS SERVICE, Feb, p57

The first major experimental plant for removing oil from oil shale has just gone on stream near Grand Valley, Colorado, U.S.A. Union Oil Co. set up the plant with the objective of finding out whether marketable products from shale oil can be produced at costs competitive with petroleum derivatives. Up until now, the U.S. Bureau of Mines has carried the burden of oil shale research. With the Bureau's activities ended, private enterprise is taking over.

American underground resources of oil shales appear larger than those in any other country in the world. Shale oil industries have long been in existence or in prospect in other countries: Scotland, Sweden, Germany, France, Italy, Spain, Russia, Manchuria, Australia, South Africa, Canada, and Brazil. But few of those in existence have more than limited local importance. Actually, only two countries have shale deposits large enough to be of world significance—Brazil and the U.S.A. And neither has yet started to exploit them in a big way.

Recoverable oil reserves of Brazilian shale deposits may be as high as 300,000-million barrels. In the U.S.A., at least 24 of the 48 states have shale oil deposits. But Colorado's Mahogany Ledge, scene of Union Oil's efforts, is the richest. With present technology, Union Oil believes that 65,000- to 70,000-million barrels of shale oil could be economically recovered from the Mahogany Ledge.

Getting at the oil in shale involves a number of problems. First of all, oil shale is not really shale at all; it is limestone with a mixture of minerals. Nor does it contain oil as such, but a substance known as "kerogen." Thermal decomposition in a retort (at temperatures above 375°C.) turns kerogen into a liquid.

This raw shale oil bears little resemblance to crude oil. It is a thick, black liquid with a high content of nitrogen, sulfur, and

unstable gum-forming compounds. Before it can be treated like crude oil, it must be upgraded by removal of its impurities. This can be done by coking (a form of thermal cracking), followed by hydrogenation (reacting the coked raw oil with hydrogen). Once this processing is complete, the raw shale oil becomes a marketable crude yielding products indistinguishable from the best natural crudes.

Thus, the competitive position of shale oil depends largely on the efficiency of the mining, retorting, and processing of the raw shale oil. The Bureau of Mines has already demonstrated that highly mechanized equipment can deliver mined and crushed oil shale for retorting at $0.60 a ton. Union Oil will not investigate this phase, but will study the retorting process.

Its new retort has a capacity of 300 tons per day. Large pieces of crushed shale are fed to the retort from the bottom, and, by a ram-like piston, are moved slowly upwards against a counter-current of hot gases. These are produced by burning the residual carbon in the oil shale ash, which is removed from the top, while the raw shale oil and gases are drawn off from the retort's bottom.

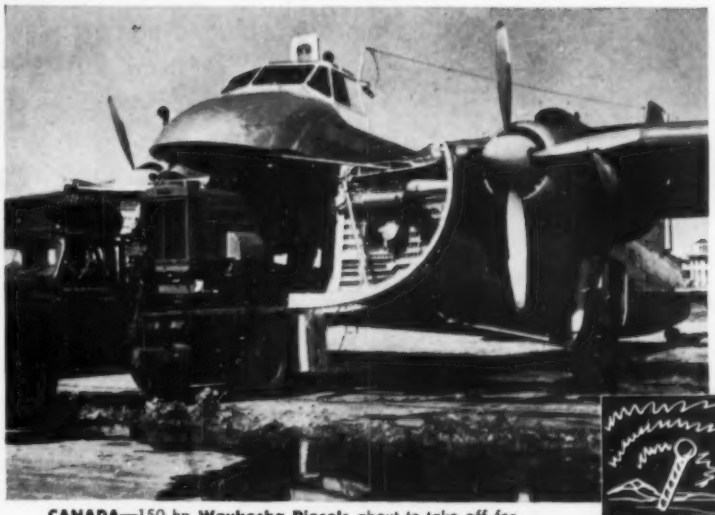
Union Oil has not yet said how much this process will cost. The company will confine its study, at present, to getting an indication of the capital investment involved in setting up a complete oil shale plant, including facilities for retorting and the partial refining of the raw shale oil to commercial crude. This investment may be about $3,000 to $5,000 per barrel of daily capacity. Future installations should cost less.

The lower figure is not out of line with total current costs for natural crude in the U.S.A. Remember, natural crude costs include exploration—something that does not apply to shale oil. And the cost of finding and producing crude oil is rising in the U.S.A., while research may reduce the cost of shale oil.

Of course, production must be large scale if shale oil is to compete with domestic crude in the U.S.A. How large, Union Oil is now trying to find out. By early 1958, it expects to have most of the answers. ●

from the Canadian Arctic----------

to Saudi Arabia----------



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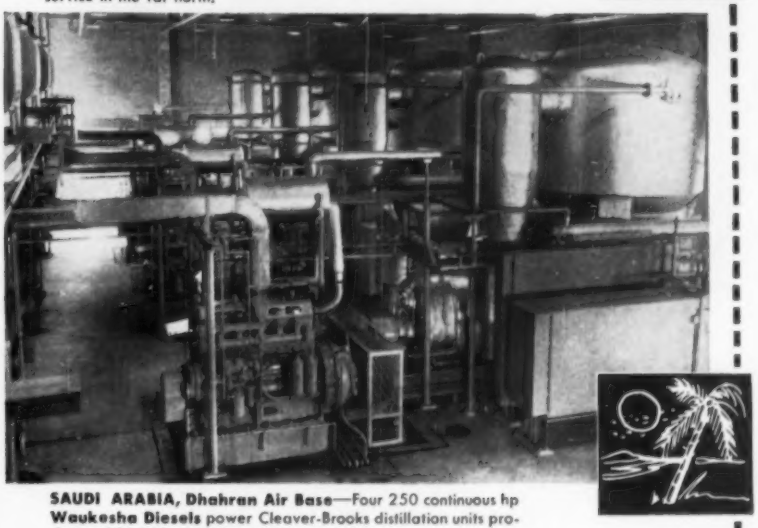

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BHE-10

How to Find Cheap Machining Methods

Many steps short of machine replacement can cut machining costs. Small-lot production benefits. But the cheapest method may not be the best.

Digested from AMERICAN MACHINIST, Dec 31, p72

The first objective in all metal-turning work is to remove the maximum amount of stock consistent with good tool life, continued accuracy of the work, and the reasonable finish needed for gaging and subsequent tooling operations.

These are the major factors you can manipulate to reduce machining time on any given part.

—The cutting tool or tools used.

—The machining methods employed.

—The choice of material for the workpiece.

Cutting tools include such items as high-speed steel, the wide range of carbides available, the new titanium carbides, and the new ceramics.

Machining methods include use of efficient and fast-cycling machine tools, use of multiple cuts instead of single-point turning, use of carbide "hole pokers" instead of present high-speed steel drills.

Choice of materials for the workpiece cover the range of free-machining grades of steel (leaded steel) which replace standard steel with no sacrifice in the end use of the part.

A study of methods followed in machining operations may frequently pay off in substantially reduced cost, reports Warner & Swasey Co. (Cleveland, Ohio, U.S.A.), machine tool and construction equipment manufacturers. For example, the company points to a study of a roller for its Gradall earthmover. By analyzing the machining methods to be employed, changing the cutting tool material, and introducing a new type of tool, it was able to cut production time considerably.

The original machining time for the roller, on a turret lathe only, was 21.42 minutes. Here is what Warner & Swasey did to improve production time:

1. The piece was cut from bar stock in the bar stock department rather than at the turret lathe. Time reduced to 17.32 minutes.

2. Applied new types of carbides and increased the spindle speed by 50%. Time reduced to 14.32 minutes.

3. Replaced the high-speed steel drill with a carbide gun drill. Time now 10.99 minutes.

4. Combined a chamfering op-

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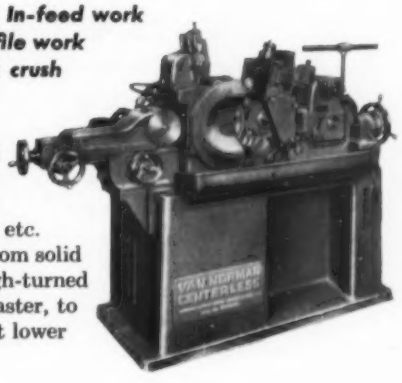

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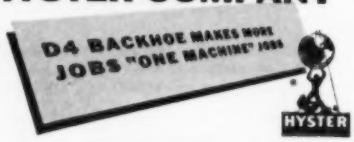

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eration with a pilot drill, instead of doing it separately. Time reduced to 9.60 minutes.

5. Replaced a starting pilot and gun drill with a high-speed-steel drill, boring bar, and carbide drill. Overall machining time for the part is now 8.66 minutes.

Much has already been said about the benefits of free-machining steel. But beware of conclusions that say it is a cure-all for cost problems. In Warner & Swasey's experience, this is not the case—because each machining situation usually involves several different cost considerations.

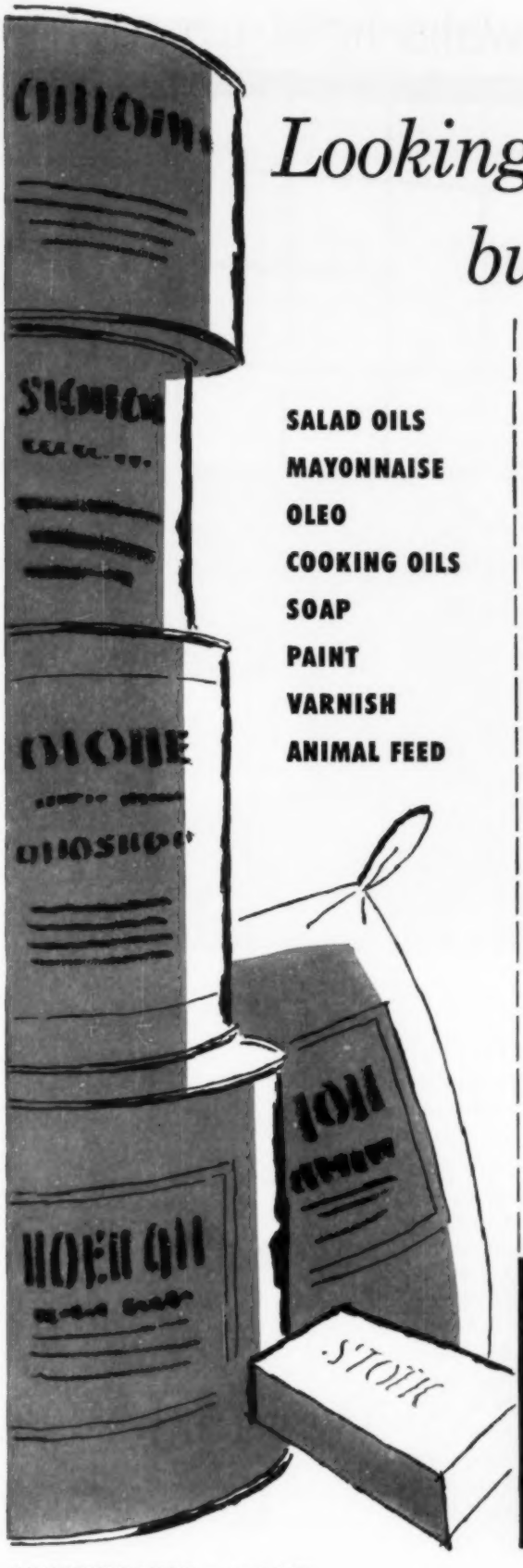
In one study, a cross-slide screw was selected for a comparison of costs between the use of regular and leaded steels. The leaded steel picked for the test was A-4140. It was worked on a standard machine, set up with the same tooling used in regular production of this part from the standard 4140 steel.

The first turning operation—on a bar 66 centimeters long—was started at the 52.5 surface meters per minute. Feed was 0.069 centimeters per revolution with a depth of cut of 0.64 centimeters. Because of the increased machinability of the leaded steel, this speed was stepped up in successive stages. A turning speed of 90 surface meters per minute was found most satisfactory.

Comparing the two materials, based on a difference in machining time, the saving per piece was $0.402. Adjusting this for the greater cost of the leaded steel, the saving per piece amounted to only $0.035.

Obviously, the leaded 4140 could be satisfactorily machined at the higher speeds with longer tool life. But, based on small-lot production, Warner & Swasey concluded that the use of leaded steel had not increased the machinability enough to warrant a major change in manufacturing procedure.

Even so, some situations exist where leaded steel can substantially cut machining time. In such cases it offers an opportunity to increase plant production without additional equipment. But each application of leaded steel must be worked out on an individual basis with complete studies before its use can be justified. ●



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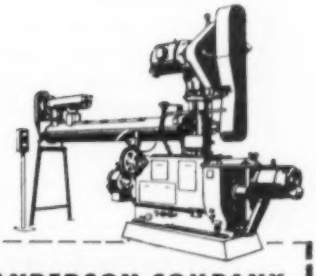

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RELIABILITY: Will your plant's power supply fail you when you need it most?

FLEXIBILITY: Can your electrical system adapt to changing demands with minimum trouble?

How Good is Your Electrical System?

Digested from FACTORY MANAGEMENT & MAINTENANCE, Feb, p138

Talk to electrical engineers and they will tell you that a plant is only as good as its electrical system.

Admittedly, this is an exaggeration. But there is no denying that a good electrical system is vital to a proper functioning plant. So if you are planning a new electrical system or revamping an old one, it may pay you to give top priority to two vital characteristics of any electrical system: reliability and flexibility. Reliability measures the ability to handle trouble; and flexibility measures the ability to adjust to change.

These two characteristics are important because your system's ability to serve the plant load continuously depends on them. A completely reliable system would supply power to all loads at all times, regardless of the failure of any individual component of the system. But this is not practical. There is always some condition that can destroy service to any plant or process. Costs would be prohibitive if you tried to insure a plant against all conditions.

I. How to Have Reliability

Reliability depends on good equipment, well-installed and well-maintained. Assuming you have good equipment, the first consideration for reliability is correct installation. For example, if all switching equipment, substations, transformers, cables, etc., were located in one small area, a fire, flood, or other catastrophe in that area would very likely stop all power service to the plant.

Here are some guides for installation and location:

—Equipment should be located where it is not subject to flooding or mechanical damage.

—Check fire protection. Oil-filled apparatus, in particular, should have some protection.

—Metal-clad bus sections should be physically separated.

—All important substations should be separated as far as is practical.

—Circuits should be installed in accessible locations.

In spite of the excellent reliability of modern system components, management must assume that pieces of equipment can fail, and that they must be removed from service occasionally for maintenance. By different circuit arrangements, however, it is possible to minimize the effect of a failure on the loads.

Because modern equipment is so reliable, most plants have simple radial systems—all loads are fed from a single line. But in some plants a higher order of reliability is needed. Complete duplication from power source to process will insure utmost reliability. As costly as it may be, this system is necessary for some plants. For instance, a refinery or a film process plant where liquids must be kept in motion would need a duplicate system so the process can be kept going in an emergency.

A variation would be to have two channels for power up to the motor that drives the process machine. The way to provide a duplicate power channel at the lowest cost is to use two radial systems and design each one as though it were going to supply only its own load.

Many plants have just a small portion of the load that is critical. In these cases, there is no general need for duplication. Extra service reliability for the critical load can be taken care of by an auxiliary engine-generator set, a separate supply from the power company, or from batteries.

II. How to Have Flexibility

System flexibility is a rather all-inclusive characteristic. A flexible system, without changes in the existing arrangement, is one that can successfully be: (1) expanded into new areas, (2) expanded to serve increased loads in original plant area, (3) adjusted to efficiently serve different layouts of production equipment within the plant.

A plug-in bus system is the key to easy layout changes. With such a system, plant machines can be moved anywhere in the shop, and the only electrical changes necessary are unplugging the machine and plugging it back in at the new location.

You can get short-range load growth by installing transformers, cable, switchgear, and other system components that are 25% to 50% oversize. But that is too costly to provide for growth of more than 25% to 50%. And with the modern modular-system design idea, there is no need to install a great deal of excess capacity. With enough planning ahead, you can add capacity, in small modules, as the need arises. Here's an example to guide you:

The capacity of a system can be increased to serve additional load areas by merely extending the primary feeder and adding more load-center (or unit) substations. When one primary feeder becomes loaded, a second primary feeder can be installed and the process continued. The only limiting factor is the main transformer capacity. And, of course, when that is reached, another transformer can be added. No alterations to the original system are involved. ●

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Looking Ahead in Technology

● **LIKE HIS COLLEAGUES all over the world, this Bangkok, Thailand, salesman for Parke, Davis & Co. (Detroit, Mich., U.S.A.) is collecting soil samples for antibiotic research.** More than 1300 P,D representatives are enlisted in a plan to systematically collect soil samples: The salesmen fill containers, return them to company laboratories in Detroit. There, each container is analyzed to determine the types of organisms in the soil. Why world-wide soil collection? Parke, Davis hopes to uncover potent new antibiotic drugs. (*Chemical Week, Feb* 16, *p*90)

● **COMPETITION from road transport is causing Swedish railroads to look for new passenger-train designs to attract customers.** One design, called KLL, is already riding the rails. It is a low-slung lightweight train resembling the Spanish Talgo. Unlike the Talgo, the KLL can travel in both directions and any length train can be made up by coupling new units together. (*Product Engineering, Jan,* *p*210)

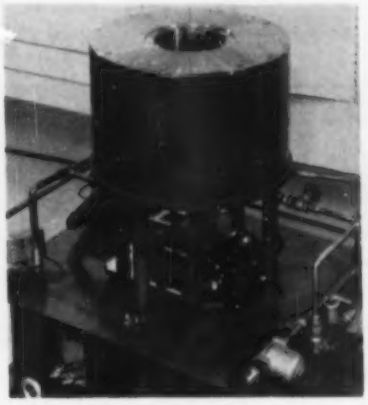
● **RUSSIAN TURBODRILLS** (MD, May'56, p23) **will soon be produced by two German firms** under a licensing agreement covering sales in 41 countries. They will be made by Salzgitter Maschinen AG (Salzgitter) and Haniel & Lueg GmbH (Duesseldorf). (*Petroleum Week, Feb* 1, *p*41)

● **MAGNETS with a tremendous strength potential are being produced from iron "dust"** by General Electric Co. (U.S.A.) researchers. They are made by precisely controlling the shape and size of microscopically small iron particles. The magnets can be embedded in plastics, metal, rubber, or glass, and are easily machined or molded precisely into any desired shape. But they are not yet available commercially. (*American Machinist, Dec* 31, *p*99)

● **BRITISH BEEKEEPERS now have something electronic in their bonnets.** Wayne Kerr Laboratories Ltd. has devised a microphone-amplifier-analyzer system that triggers a signal before a hive of bees is about to swarm. The bees' humming changes frequency a half hour before swarming, something an experienced beekeeper can hear only if he is right on the spot. (*Electronics, Feb* 10, *p*42)

● **TRANSPARENT SILICONE rubber is now available.** Dow Corning Corp.'s (Midland, Mich., U.S.A.) Silastic Type K silicone rubber will replace the conventional plastic safety glass interlayer in the windshields of supersonic aircraft. Plastics cannot withstand temperature extremes encountered by such fast-flying aircraft. Normal temperature range for plastics is about −54°C. to 83°C. The new silicone rubber retains clarity and full strength through a range of −54°C. to 178°C., reports Dow Corning. (*Aviation Week, Jan* 14, *p*82)

● **SHEET STEEL can be clad with titanium** by a new British process. First, one side of a sheet of titanium is electroplated with iron or nickel, while the other side is protected by a lacquer coating. After electroplating, the lacquer is stripped off and the plated side of the sheet placed in contact with the steel plate. Both sheets are fired in an inert-gas atmosphere oven, and the thin electroplated layer bonds the two sheets together. Final step is rolling to reduce thickness. (*Product Engineering, Feb, p*9)



● **SMALL NUCLEAR critical-assembly machine can operate at power levels up to 3 kilowatts.** It was conceived at the Los Alamos Scientific Lab of the University of California, U.S.A., in the 1940's during research for the atomic bomb. Now a unit has been built. It is actually a small, versatile experimental reactor that brings together enough fissionable material to form a chain-reacting critical mass. It can be used to determine the criticality of various materials and shapes, to supply large quantities of neutrons, and to study the effects of surrounding and interspersed materials. The machine is portable, about the size of an armchair, and can be used outdoors to avoid undesirable effects of neutron scattering and reflection from sourrounding walls. (*Product Engineering, Feb, p*209)

● **ELECTRIC - CONDUIT - TYPE CABLE is "almost certain" to carry natural gas** from the British Columbia mainland to Vancouver Island in Canada. Magna Pipeline Co., Ltd. is considering a continuously-extruded, steel-reinforced, lead-alloy cable made by British Insulated Callender's Cables, Ltd. An advantage of the cable is that it can be unreeled from a ship in one continuous operation. And it is expected to provide fewer maintenance problems

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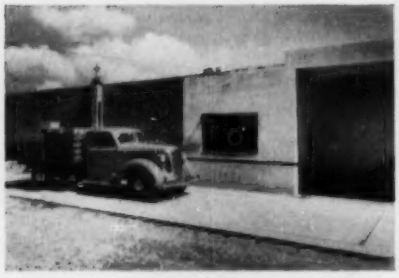

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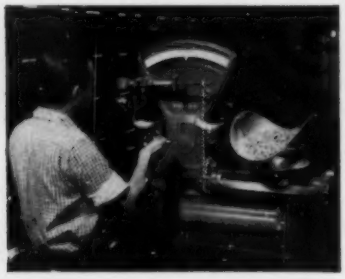

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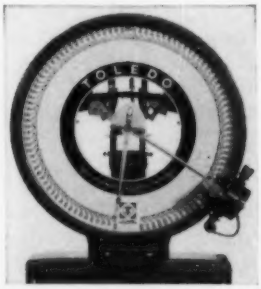


Automatic Cut-Offs—Both mercury and photoelectric controls are available for simple filling operation or complex batching system.

TOLEDO SCALE COMPANY
TOLEDO 1, OHIO, U.S.A.

than a conventional steel pipeline. The cable will provide up to 900,000 cubic meters of gas daily to Vancouver Island. (*Petroleum Week, Jan* 18, *p*36)

● **ATOMIC-POWERED LOCOMOTIVE is on the drawing boards of the German Federal Railways.** It will have a power output of 5900 horsepower and will weigh 175 tons. The engine will be powered by gas-cooled reactor, and running costs are expected to be $0.48 per kilometer—less than the operating cost of a steam engine, but slightly more than that of a diesel-electric engine. (*Product Engineering, Feb, p*10)

● **ATOMIC ENERGY has been used to vulcanize an automobile tire** by B. F. Goodrich Co. (Akron, Ohio, U.S.A.). The tire, set in a steel mold, was vulcanized by rotating it slowly over radioactive fuel elements taken from a nuclear reactor. Goodrich scientists claim improved wearing properties; tests showed the tire had 8% to 10% better resistance to abrasion than a conventional tire and twice as much resistance to aging and deterioration.

● **NYLON is being used to improve the finish of cottons.** Rubin Levine Co. (New York, N. Y., U.S.A.) is marketing a cotton cloth finished with a solution derived from nylon flake. The finish is said to improve the fabric's tensile strength, gives it a silkier finish and better wrinkle recovery. It will be offered in "wash-and-wear" apparel.

● **TRANSISTORS revive hopes for practical heat-operated radios.** A thermopile on top of the glass chimney of an Aladdin kerosene lamp generated enough electricity to operate a transistor radio in tests at Philips Research Laboratories (Eindhoven, Holland). The set used 200 thermocouples welded together, with half the junctions in the stream of hot gases coming out of the lamp chimney and the other half pointing outward for air cooling. (*Electronics, Feb* 20, *p*21)

COSTLY CREDIT AND SCARCE CAPITAL are putting the squeeze on available cash and liquid assets.

SO TREASURERS are making money go farther, and work harder, with a variety of cash-saving expedients.

How U. S. Firms are Conserving Cash

Digested from BUSINESS WEEK, Feb. 9, p112

Cash requirements are rising, money is expensive, credit is scarce and hard to get. This puts financial executives on their mettle, and puts new emphasis on getting the most out of money flowing through a company during its day-to-day business.

Cash planning and forecasting is the starting point for most financial officers. It is simply the study and control of the in-flow and out-flow of cash. And it is being recognized as a vital management technique (MD, July, '56, p36).

But forecasts must be detailed, and accurate. It takes at least a year, says one experienced company treasurer, to get executives used to cash planning. "At first," he says, "they tend to predict less volume than they actually expect, so they will look good at the end of the year."

I Generating Cash

There are a variety of techniques and tricks for management to consider in attacking the cash problem. Here are some now being used by American corporations:

A New York executive whose company has plenty of cash at present says that, if his company should need more working capital, his first step would be to cut down the number of bank accounts.

"For years," he says, "in order to make friends, we've kept a great number of balances in banks all over the country. Many are virtually dormant." After trimming the accounts to the ones his company really needs, his next step would be to cash government securities.

Some companies, especially the big ones, find they can use their funds more fully and more flexibly if they cut down on the number of separate corporations of division status. American Radiator & Standard Sanitary Corp., for example, boiled six corporate divisions down to a parent company plus one corporate division.

Each division used to generate and hold a lot of cash. These funds now go to a central account, can be shifted around as occasion demands. "We used to operate with cash at about 10% of sales," says an officer. "Now it's between 5% and 6% and could go lower."

Another company merged its distributing corporation with the parent company. This move freed $10-million which it had, in effect, been using to pay itself.

II Speeding the In-flow

Another way companies can build up their cash position is to collect their accounts receivable faster from their customers.

This is sometimes done by physical means:

—Picking up checks from large customers (such as the government) by special messengers and using telegraph or teletypewriter to get them credited.

—Speeding up deliveries to get paid sooner.

—Making use of regional payment plans like that of Bank of America in California. Customers send all checks to a central post office box in their region; the bank picks them up and telegraphs the total credit to the depositor's main account. The bank says this plan enabled one good-sized electrical appliance manufacturer to free $300,000 in its over-all balance last year.

Faster turnover of money is equivalent in many ways to more money, treasurers say. That's why so many companies, large and small, are trying to get customers to pay their bills a little earlier—while they themselves try to pay their bills to suppliers a little later.

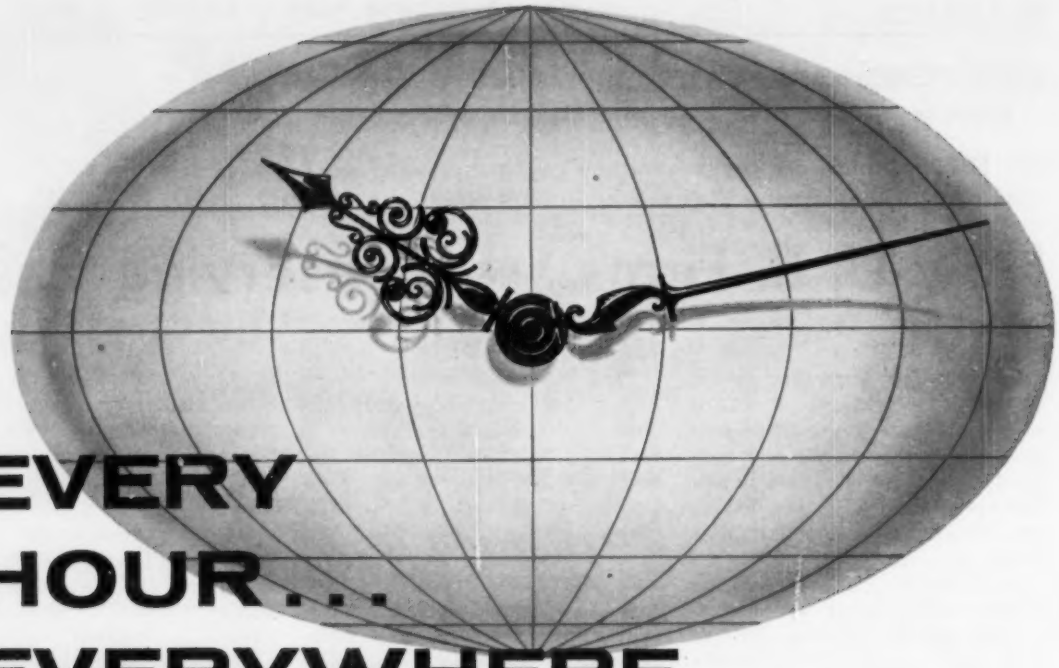
In their search for working cash, many treasurers are turning to selling their accounts receivable. "Factors"—commercial financing companies—make a business of buying such accounts at a discount. In 1955, about 400 factoring companies in the U.S. did $4,900-million worth of business. And they estimate that 1956 topped that figure by 15%.

Factors buy receivables in two ways. In softgoods, they take accounts over without legal recourse in case of credit failure. In hardgoods, they accept them usually with legal recourse to the client if customers don't meet payments. This type of credit is expensive (by North American standards) for hardgoods—about 12%. But, on the other hand, a factor's loan is paid for only as money is actually drawn. Thus, it is sometimes cheaper than bank loans.

III Slowing the Out-go

As important as speeding up the inflow of funds is the slowing of the outgo. Here, the most widely practiced way of freeing cash is to cut back inventory. Operations research consultants claim their mathematical analysis techniques can often cut clients' inventories by 15% to 20% without impairing their service to customers.

But it might be dangerous to cut back on finished inventory if it risks a customer's dissatisfaction—he might be cutting inventory too and counting on you for quick delivery. It is equally dangerous to build up inventory of your own



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Brazil	Ecuador	Guatemala	Mexico	Sicily
British West Indies	Egypt	Holland	Newfoundland	South Africa
Canada	El Salvador	India	Norway	Spain
Chile	England	Israel	Panama	Spanish Morocco
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"As important as speeding up the in-flow of funds is the slowing of the out-go."

materials just because prices are rising, treasurers say. Sometimes it can be smart, but one banker has this to say of small manufacturers with an addiction for heavy inventory building:

"They think they're hedging against prices, but all they're doing is tieing up precious money. These people are usually local manufacturers competing with large national concerns. I can't get them to realize that, over the long run, the big companies will be paying just about the same prices for raw materials as the small companies."

There is also an extra pressure on company treasurers to cling to funds that might otherwise go out in dividends. Treasurers are also exploring U. S. tax laws for ways to conserve money. One is to adopt one of the faster methods of writing off depreciation on equipment. Fewer companies are using the traditional "straight-line" method—deducting an equal amount each year.

Another is to convert some of the company's property into working capital by selling it, then leasing it back for tax-deductible rent.

One company needed a more favorable balance of working capital in order to bargain with its bank for a long-term loan. The company sold some property (two small marine terminals) to private investors, taking a lease on the property. The transfer generated a healthy amount of spending money and made possible a long-term loan of $6-million.

In a time of rising prices, a company can save tax money by appraising its inventory under the LIFO (last in, first out) method. LIFO accountants use today's raw material prices—not the original cost—in figuring the cost of finished goods. This keeps the company from showing a paper profit on its inventory as prices rise. It makes company profits look smaller, and taxes are lower. But if prices should go down, LIFO backfires as a means of retaining capital. ●

▶ FINANCIAL DIGEST

How will business react to easier money in Britain and West Germany? Monetary experts are carefully watching.

The Bank of England called its new discount rate (reduced from 5½% to 5%) a "technical adjustment" to a sharp drop in the market for Treasury bills. And the British Treasury warned that it wasn't dropping its guard against inflation.

Monetary experts noted, however, that the West Germans had lowered their bank rate sometime earlier. Furthermore, these two countries had led the world up the discount path of inflation control.

In three jumps, for instance, the Bank of England raised its rate from 3% to 5½% in one year—between January 1955 and February 1956. Each jump was taken as a red-light warning of inflation. The bank rate became "a grand signal rather than a flexible technical instrument," comments The Economist.

The British and West German decisions do not mean, of course, that other countries will follow their trend to easier money. But the experts ask, "Will business take the lower bank rates as a green light?"

●

The International Monetary Fund has come to life.

In February the IMF agreed to sell India $200-million for rupees to ease that country's foreign-exchange shortage. France has been given permission to draw $40 million, in addition to a $262.5-million stand-by credit granted last November. And remember that Britain was granted credit to purchase $1,300-million with sterling just after Suez.

In effect, these transactions are dollar loans. There are no specified rules for repayment, but the understanding is that a borrowing member will repurchase its own currency with dollars or gold within three to five years.

These recent IMF actions, observes the U. S. Council of the International Chamber of Commerce, "indicate that the Fund is now willing to use its resources more freely than in the past"—a good omen in international financial affairs. The Council points out that the Fund transacted only $1,200-million worth of business in the past nine years—and two-thirds of this was right after World War II.

The Suez Canal blockage is the tonic that brought IMF back to life.

●

The Export-Import Bank continues to go quietly about its business of granting loans. A typical loan: $16-million (backed by a government guarantee) to Nacional Financiera SA, Mexico, to help finance expansion of the nation's steel-making facilities.

●

Unable to raise working capital through bank loans, an American meat packer is borrowing from its own workers. All 300 employees of Hammond Stanish & Co., Detroit, Michigan, will place 10% of their paycheck for the next five years into a capital fund. The company will pay 6% interest. However, any losses during the five years will be deducted from the fund, which then will be distributed on a pro rata basis. No officer of the company will receive a raise during that time. Why did the workers approve the plan? "Our jobs were at stake," the union president told the Wall Street Journal.

Maurice Gattegno, proprietor, (left

. . . result in enough sales . . .

A French

Digested from BUSINESS WEEK, Feb 2, p46

Maurice Gattegno, looking down at left, is known to his fellow Parisiens as Monsieur 20%, a name that marks him as the most controversial shopkeeper in France. Gattegno introduced "discount house" selling to a nation that for centuries has done its buying in small, low-volume, high-markup shops.

Discount houses are stores that sell well-known brands of merchandise well below the manufacturer's "recommended" prices. Monsieur 20% gets his name from his discount—he simply reduces the recommended prices by 20%. The discount system got its start in the United States, where pioneering discount houses fought legal battles for years with "fair-

watches crowds at film counter . . .

. . . and customers checking catalog for discount prices that . . .

. . . to overcrowd his small Studios Wagram . . .

. . . and build new Chez Monsieur 20%

Revolution in Retailing

trade" manufacturers. The full impact of discount selling in France is still to be felt, but many observers think it may prove as revolutionary there as it has in the U. S.

Monsieur 20% picked up his idea on a trip to America in 1954. One day, in White Plains, New York, he walked into a discount house. "I was amazed," he says. "The idea was so simple, yet it worked so well."

Back home in Paris, Gattegno tried the idea himself. In one month he sold more than his usual sales for 12 months. "They were lining up in the streets," he recalls. In his first year of discount selling, he took in a gross of $730,000. Last year, sales climbed to $1.2 million. He predicts well over $2-million in 1957.

Gattegno adopted the discounter's standard formula: low markup, high volume sales, a simple store to keep overhead costs down. He has 19 employees—but only four salesmen. He carries a small inventory, offers no home deliveries—and 98% of the sales are cash.

Every item Studios Wagram sells is listed in a bright yellow catalog that the customer picks up when he comes in. Next to each listed item are three columns. One shows the manufacturer's "recommended" retail price (imposed prices are theoretically taboo in France). This price includes a markup of from 20% to 60%, with around 35% the average. Gattegno deducts 20% from this price to get his own, shown in the second column. To emphasize his point, he shows the amount the customer saves in the third column. That 20% reduction allows Gattegno an average 17% markup.

The percentages may be confusing. Here is an example:

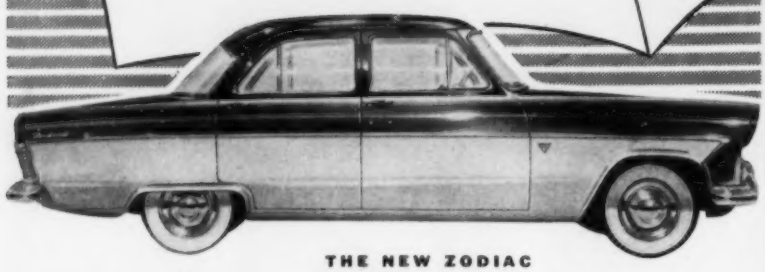
Suppose the regular Paris retailers sell a piece of standard merchandise for 1,000 francs. This price would include, on the average, a markup of 35%. In other words, the retailer paid 650 francs wholesale. Gattegno pays the same wholesale price. His selling price, however, is 20% below the recommended 1,000 francs, or 800 francs. So his profit is the difference between 650 francs and 800 francs—a markup of 17% to 18%.

In addition, though, he gets a 2% discount for paying cash, plus a special 4% yearend rebate for heavy ordering. Few retailers in France can earn these extra rebates.

So far, Gattegno sells photo equipment, radio and television

"The Three Graces"

MAKE NEWS



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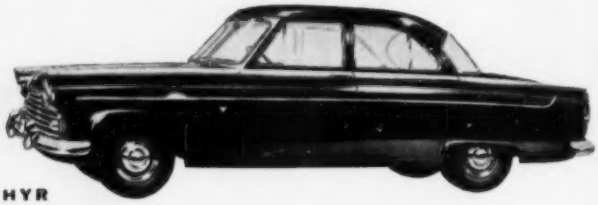
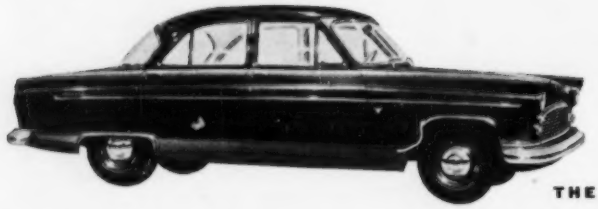


THE NEW ZEPHYR



THE NEW CONSUL

...and World-Wide service too!

PRODUCTS OF FORD ENGLAND MOTOR COMPANY LTD

"Monsieur 20%"

sets, and household appliances. He has just moved to bigger quarters near the busy Gare St. Lazare; and he may branch out into clothing and infants' wear.

But, right now, Gattegno's biggest problem is getting enough merchandise to sell—a problem familiar to U.S. discounters. Many manufacturers refuse to sell to Monsieur 20%. A common complaint is that Studios Wagram is waging a "senseless economic war."

"I can't fight them all," says Gattegno, "so I settled on a test case." That test case is with Thomson-Houston Co., a major French radio, television, and appliance manufacturer.

When Thomson-Houston stopped selling Studios Wagram its radio and TV sets in April, 1955, Gattegno promptly sued under an untested anti-price-fixing law. Today certain government officials confess they are not sure what the law does prohibit, though the Ministry for Economic Affairs recommended the case to the Paris criminal court for trial. In the meantime, both sides have furiously exchanged legal memoranda in preparation for the hearing.

Thomson-Houston says its refusal to sell doesn't stem from the discount pricing. It complains, rather, that Gattegno's selling and service facilities are not up to standard, and that for a time, at least, Monsieur 20% wasn't really giving the discount he claimed.

Finally, Thomson-Houston bases its action on dealer complaints that they are becoming mere demonstrators of products that the customers eventually buy at Studios Wagram. ●

EXPERIMENTS AND EXPERIENCE with products from corn to soap cleanser show that . . .

Multiple Packages Increase Sales

Digested from SALES MANAGEMENT, Feb1, p52

The most exciting idea in marketing consumer goods is the "multiple package"—selling goods in packaged units of two, six, 10 or whatever number is best suited to the product.

Multiple packages are by no means new. But until recently they were used mostly for beverages. Now, American shoppers can buy multiple packages of everything from salt to furniture polish, fruit juice to tuna fish.

And the trend is expected to continue. Closely controlled tests show that sales increase with the use of multi-unit packages—if the proper technique is used.

A careful test with canned corn produced clear-cut results. The experiment was made through the combined efforts of a container manufacturer, a food store chain, and a food processor. Special cartons were designed for the experiment, which made use of single cans, three-can packs, four-can packs, and six-can packs. The experiment lasted for six weeks.

No price advantages were offered—a six-can carton sold for six times as much as a single can—and no advertising was used. The experiment was designed to test the selling ability of the multiple package alone.

When multiple packages (four and six cans) were displayed without a choice of single cans, 30% of the sales still came from broken packages. Many customers simply broke the cartons and removed single cans. But total sales of corn declined in these stores during the period.

When multiple packages were displayed alongside single cans, total sales increased. In stores offering a choice of a three-can pack, total sales were up 27%. Stores with a choice of a six-can carton reported an increase of 31%.

The experimenters conclude that multiple packages do increase sales. But how much depends on the product. One executive suggests that a good rule is to educate the consumer gradually. Start out on a multiple-unit package which contains one more unit than the shopper is accustomed to buying.

And these men are convinced that multiple packages produce new sales, rather than condensing several sales into one purchase. Their research seems to show increased consumption per capita in addition to new sales to new consumers.

One reason, they say, is that the multiple package has "built-in-point-of-purchase publicity." When the shopkeeper stocks the product, he automatically puts up a display advertisement. Users of multiple packages take advantage of this by coordinating the package label with their advertising themes in various media.

Multiple packages have other uses, too. One manufacturer uses six-can cartons as an aid to his distributors. Retailers, not the ultimate consumer, buy these multi-unit packs.

In another case, a company developed a new kind of cat food that was made of fish but did not smell like fish. Pretesting the food, however, had turned up the discouraging fact that sometimes it took several servings to win cats over to the product. The company thought that housewives would like the cat food because it didn't smell; but, on the other hand, they might be discouraged from buying a second can because of the first reaction of the cat. A multiple package solved the problem of introducing the product. ●

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● CONSTRUCTION

Trends in World Construction

● **A METHOD of prestressing, casting and curing precast concrete pipe, making on-site fabrication feasible, has been developed** by Dr. Rolf Schjodt, Oslo, Norway. His method uses simple hydraulic jacks, replacing the relatively costly machines that wrap stressed wire around the outside of the pipe.

The cross-section of the pipe is an eight-sided polygon with concave sides. The concave shape of the sides permits the stressed wire to be located close to the interior surface of the pipe where it provides optimum performance in resisting tensile stresses caused by liquid pressure in the pipe.

To produce the pipe, unstressed wires are wound around a longitudinal steel frame and then stressed by a series of hydraulic jacks radiating out from the center. Steel forms are placed and concrete is cast.

As soon as the concrete can hold its shape, the forms are moved a few inches away from the pipe without releasing the wires. The annular spaces obtained are used for steam curing. The prestress can be released after only 12 hours of steam curing. (*Engineering News-Record, Dec.* 20, *p*56)

● **CONSTRUCTION in Latin America enjoyed another record year in 1956.** But the boom has not been without its troubles. Shortages of trained engineers, building materials and money plagued the area. Even so, all the signs point toward a still better year for 1957. Projects scheduled for completion this year add up to $12,200-million. Last year's figure was $10,370-million. Biggest single slice of 1957's money—$3,750-million—will go into buildings with highways next at $2,295-million. The expenditure for power projects—$1,795-million—reflects the area's need for power.

Skilled labor is scarce in almost every country, but the building boom has emphasized this and now schools and apprentice training systems are starting to fill the gap.

Money, too, is being made available in ever increasing quantities. International financing institutions are providing some. National governments are investing more public funds, and private capital is beginning to meet more of construction's needs. These trends are likely to continue for some time into the future.

But production of materials have not been able to keep up with building's demands. It is likely that for some time to come, cement, steel, stone, and gravel will be scarce, and probably expensive. Still, Latin Americans are aware of this and are making plans to build up their materials industry.

Perhaps the greatest progress has been made in the availability of machinery. Not only has there been a great flow of machinery into Latin America, but more and more manufacturers are establishing production lines in Latin countries.

Over-all, there appears to be no serious setbacks ahead in the growth of construction in Latin America. The demands for more highways, power stations, bridges and buildings practically guarantee this. (*Ingenieria Internacional Construccion, March, p*40)

● **SAO PAULO, Brazil's second city, is improving on the supermarket.** Conjunto Nacional, a super shopping center now under construction, will provide housing right on the premises.

A six-story base section one block square will contain a supermarket, stores, banks, restaurants, theaters and an 800-car garage. Topping the commercial block will be a 23-story apartment house framed in reinforced concrete.

Wide faces of the apartment house will be window bands, separated by spandrels at floor levels. End walls will consist of precast concrete elements. Apartment house dwellers will enter the shopping center by way of elevators, ramps and moving stairs, accessible from a landscaped roof garden and playground that is situated atop the commerical block. (*McGraw-Hill World News*)

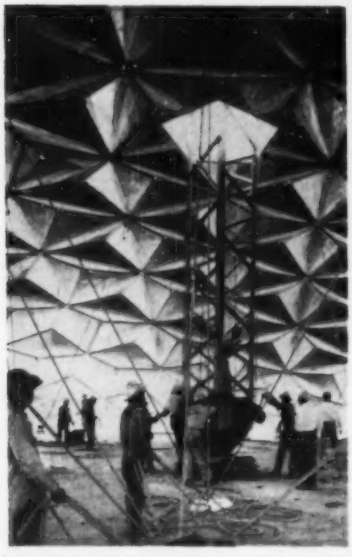
● **SIGNIFICANT field-test data on the electric membrane method of**

● **A CONSTRUCTION TRAIN made up of three separate units speeds the job of setting poles** for overhead electrification of a British railway. An earth auger bores holes, an erection unit sets poles in place, and a concreting unit finishes for British Insulated Callender's Construction Ltd. (*Construction Methods & Equipment, Feb, p*52)

demineralizing saline waters has been made available. Ionics, Inc. (Cambridge, Mass., U. S. A.) reports that a 8,000 cubic meter per day plant could produce potable water at $0.105 per cubic meter, under certain conditions. The cost applies only for brackish waters (not sea water) containing from 1,000 to 5,000 parts per million of dissolved solids. Largest operating costs are said to be membrane replacement and capitalization.

The Ionics process removes ionized salt and mineral particles from natural waters by a direct-current electrical field that transfers the particles through thin plastic membranes. Water flows in a film 1 millimeter thick between two membranes. Depending on the charge of the membrane, it passes either negative or positive particles, but not both.

The biggest electric membrane plant yet installed—a 345-cubic-meter-per-day-unit—is soon to be in operation on Bahrain Island in the Persian Gulf. (*Engineering News-Record, Feb.* 14, *p*59)



● **ROOF of 1,800-seat auditorium just completed at Waikiki, Hawaii, is a light-gage aluminum dome** spanning 43.5 meters. Designed by Kaiser Aluminum & Chemical Corp., the dome (above) is an assembly of diamond-shaped aluminum panels bolted together at their edges to form a rigid spherical shell 15 meters high. Here's how the structure was erected:

The 25 foundation piers were set first, and then a 28-meter temporary construction mast was set up in the center. Next, the ring of panels closest to the mast were bolted together, and hoisted just enough to make room for the next, and slightly larger, ring of panels. This process was repeated until the whole dome was assembled. The final step was to remove the mast so that a cover could be bolted over the hole in the center. (*Business Week, Feb* 2, *p*75)

● **THE BIGGEST thin-shell-concrete barrel arches ever precast were hoisted into place recently** in Daly City, California, U. S. A. to form the roof for a high school gymnasium. The units, weighing 20 tons each, are 6.75 centimeters thick, 18.3 meters long 4.5 meters wide with a 1-meter rise. Each arch spans 15.6 meters between precast, three-hinged supporting bents. Each bent spans 27 meters.

Conventional techniques would have required falsework to support

Photo by courtesy of Messrs. Rubery Owen & Co. Ltd.

The BITTERN

3-Brush Scarifying machine in action removing *impacted* grease from a factory floor

THE BITTERN SCARIFYING MACHINE

Designed & Manufactured by

Cimex-Fraser Tuson Ltd.

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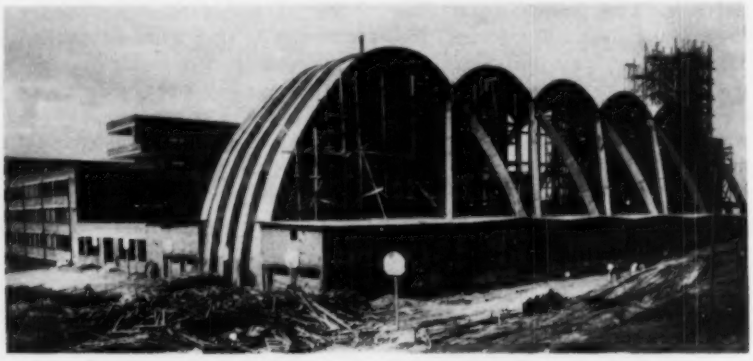
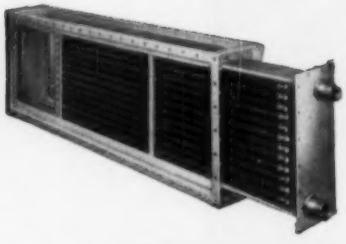
the arch forms for concrete pouring. But this would have been prohibitively expensive. Hence the designers choice of precasting the arches on the ground and then hoisting them into place on the bents.

The contractor set up a casting line with six sets of forms and was able to cast six arches (495 square meters) in less than four hours. Each arch was set in place in one hour, including hauling time. (*Engineer News-Record, Jan* 31, *p*45)

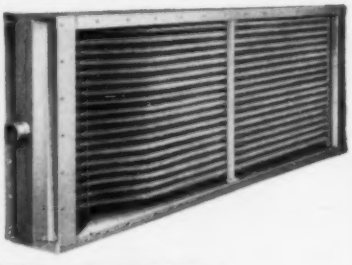


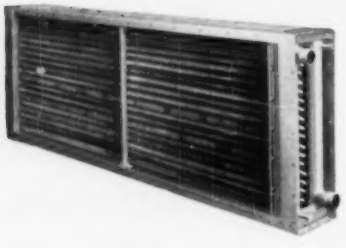
Heating and Cooling Coils for every need



HEAVY-DUTY COILS — for industrial and process heating. Handle pressures up to 350 lbs.; built for easy maintenance; highly resistant to corrosion. Request Bulletin B-1318.

HEATING COILS — wide range available for blast heating, zone reheating, modulated steam control, steam or hot water. For further details send for Bulletin B-1218.





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CANADIAN SIROCCO PRODUCTS

● **REINFORCED concrete arches (above) that intersect under the roof at an angle of 90° form the frame of a new church** in Medellin, Colombia. The structure is supported at the two ends and at 12 intermediate foundation points —six on each side—that are articulated to compensate for expansion and contraction due to extremes of temperature normal to Medellin. (*Construction Methods & Equipment, Feb, p*52)

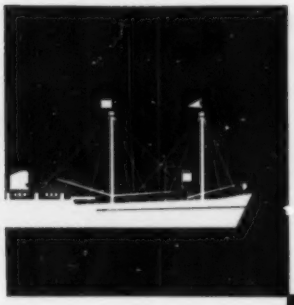
● **CONSULTING ENGINEER, Arnold Rosner (Max Rosner & Assoc., Chicago, Ill., U.S.A.), writing in Rock Products magazine, has tackled the difficult task of peering into construction's future** to see what shape the industry's technology may take. Here are some of his observations:

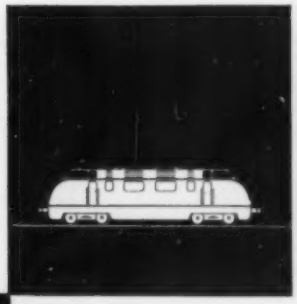
—Production line methods will be adopted. More of what is now made at the job site will be made in a factory. This presupposes a steady adoption of standard modules.

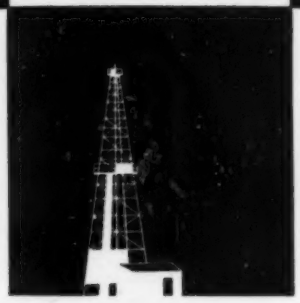
—Plastics, glass, and ceramics will be more widely used.

—New forms of construction will appear. One possibility is the development of the inflatable plastice beach toy or air mattress. Air is the cheapest filler there is for sandwich or hollow wall construction. A typical floor could consist of 25-centimeter diameter tubes with less than a millimeter wall thickness. These tubes would be inflated to about 100 kilograms per square centimeter and sealed. Such members could span 12 meters. Filled with helium and used as roofs they could span 30 meters.

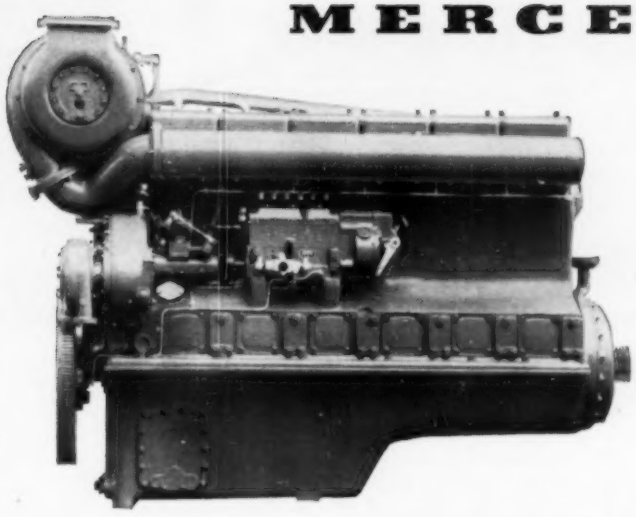
—Plastic sheets could roof huge areas, providing the area was kept under slight air pressure.







MERCEDES-BENZ



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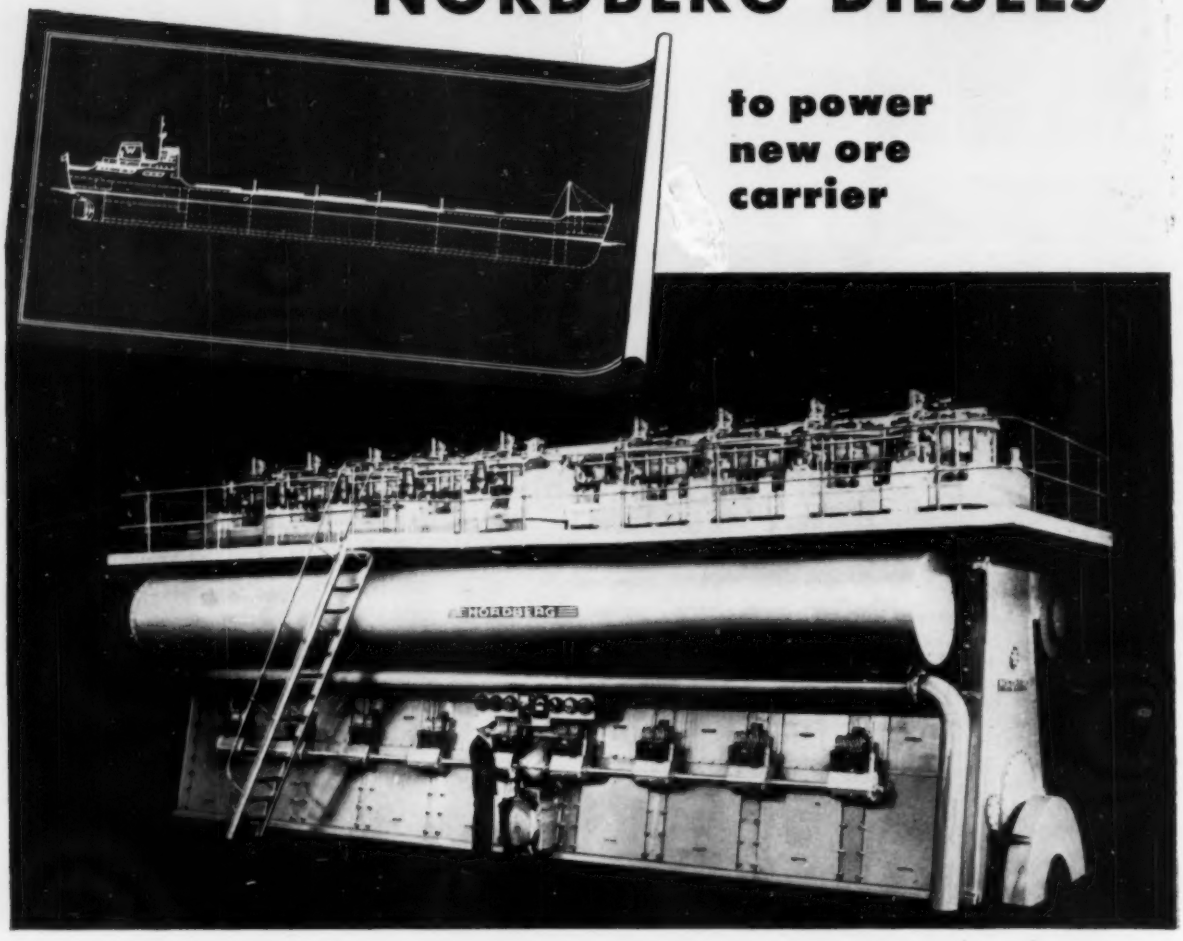
to power new ore carrier



total of 8600 horsepower for propulsion and auxiliary power

Wilson Transit Company has awarded a contract to Canadian Vickers, Ltd. for a new 20,350 dwt bulk ore carrier, almost 600 feet in length. In keeping with its modern design and construction, this new ship is to be powered with a 6800 hp 8-cylinder Nordberg 2-cycle Diesel Marine Engine of 29-in. bore and 40-in. stroke, which has a proven record of successful operation on inexpensive heavy Bunker type fuels. This direct drive, heavy duty, non-reversing Nordberg engine will turn a controllable pitch KaMeWa propeller at 167 rpm, which eliminates the need for direct reversing.

In addition to the main engine, Nordberg will also furnish two 4-cycle, 6-cylinder supercharged engines, each rated 900 hp, and connected to 635 kw generators for auxiliary service . . . making a total of 8600 Nordberg Diesel horsepower on board this new bulk ore carrier.

This new ship will operate in the Canadian ore trade until the St. Lawrence Seaway is opened, at which time the vessel can be scheduled for Great Lakes service.

Write for further information, outlining your power requirements.

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. . . gives up its identity to this drum . . .

Cheaper Chemical Testing

A quick and easy method of making chemical analyses is now within the reach of the small laboratory and company. A double-beamed infrared instrument that costs about one-third as much as models previously available has been developed for conducting qualitative and quantitative analysis. It sells for $3,850 in the U.S.A. and is available abroad through the manufacturer's affiliates.

The instrument, called an Infracord Spectrophotometer, is a compact, self-contained unit that can be set on a desk. It is 27½ inches long, 17 inches wide, and 8½ inches high. It weighs 120 pounds and uses a 120-volt, 60-cycle power source.

To work it, all an operator has to do is put a piece of chart paper on the drum, insert a sample in the instrument, and push a button. The instrument does the rest. At the end of the 15-minute rotation of the drum, the chart is removed. A line graph that has been drawn by the instrument's inked stylus is then compared with a standard set of graph charts. When one is found that matches, the operator knows what the components of his sample are. The quantity of components present can be found by measuring the curves and calculating their concentration on a calibration curve. **(The Perkin-Elmer Corp., Danbury Road, Norwalk, Connecticut, U.S.A.)**

Silicone Packing Materials

A complete selection of silicone rubber packing materials has recently been introduced. Silicone rubber works well where resistance to aging, sunlight, ozone, and compression is required. Silicone's ability to withstand high and low temperatures, its dielectric properties, its resistance to low swell mineral oils at high temperatures and to a variety of chemicals, make it an excellent sealer.

Silicone products include diaphragms, gasketing, sheet packing, oil seals, rings, insulation tape, and rod and valve stem packing. It is also available in sponge and in molded, extruded, die cut and metal-bonded shapes. **(The Garlock Packing Co., 402 Main St., Palmyra, New York, U.S.A.)**

Die Casting Machines

A new line of high pressure, cold chamber die casting machines is available in 200, 400, 600 and 800 ton capacities. A clamp link-wedge locking mechanism, plus extra heavy platens and tie rods locks and preloads dies to rated tonnage. Improved locking reduces "wear and tear" on dies and maintains casting dimensions.

Compact design of the injection end, in addition to the rugged clamp, has made possible the production of difficult castings with a minimum of "cut and try" on gates, vents and overflow. **(The Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, U. S. A.)**

For Electronic Design

A flexible ferromagnetic plastic, trademarked FERROTRON, is now available in sample kits. The kits are being offered to electronic designers to facilitate the investigation of new circuit development. Miniaturization of components is

One Plant Eliminates 8 Tons of Dangerous Dust Per Day!

AAF ROTO-CLONE COLLECTORS TRAP 17,400 POUNDS TO BE EXACT! This plant had a major dust problem—one that "weighed in" at 17,400 lbs. per day. This tremendous tonnage came from nine different plant sources. It foiled production, irritated workers and "showered" the surrounding neighborhood. An AAF dust control system installed at each of the nine dust-producing operations provided the solution.

WORLD'S MOST COMPLETE LINE OF DUST COLLECTION EQUIPMENT. Twenty-five years of experience in living with industry's complex dust problems had led to the development of the *one* complete line of equipment—a line that includes dynamic precipitators, hydrostatic precipitators, dry centrifugals and fabric arresters.

TURN DANGEROUS DUST INTO DOLLAR SAVINGS. If you're producing an unwanted by-product—dust—in your plant, let an AAF expert show you how it can be controlled, profitably. Write for name of your local AAF representative and free folder, *"Better Air Is Our Business."*

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one possibility in using the flexible forms, since they permit design essentially within "a magnetic atmosphere."

Not a magnetic recording tape, this iron powder product is unique in that it is as flexible as paper and yet possesses such unusual properties as good dielectric strength, constant magnetic permeability over a wide range of frequencies, and excellent moisture and temperature resistance. It is in rod and tape form. The tape is ½-inch wide and stocked in thicknesses of 4, 8, 16 and 32 thousandths of an inch. **(Polypenco, Inc., 2150 Fairmont Ave., Reading, Pennsylvania, U. S. A.)**

For Bulk Materials

The Uni-Hopper was developed to facilitate the handling of small quantities of bulk materials. It is a portable, rectangular bin on four legs, built of 12-gage hot-rolled steel, 48 inches long and 42 inches wide. It is now being manufactured in three standard heights—43, 68, and 90 inches. These hold, respectively, 36, 65, and 88 cubic feet of material. Loads of up to 5000 pounds have been handled.

The 22-inch diameter opening is big enough to handle almost any type of commodity and with the heavy-duty drum lid in place, the bin is hermetically sealed. **(Delta Tank Manufacturing Co., 122 E. 42nd. St., New York 17, New York)**

Heavy-Duty Dump Truck

Model AP-25 off-highway rear dump truck is rated at 25-ton payload capacity. It is equipped with a planetary-gear drive rear axle, and is designed for heavy-duty work in construction, quarrying, and mining. The truck is available with either a 335 or 375-horsepower turbo-diesel engine.

An adjustable steering wheel is one of the features especially designed for operator comfort. It can be set quickly to fit any driver. **(The White Motor Co., Autocar Division, E. 79th St. and Wallace Ave., Cleveland, Ohio, U. S. A.)**

Automatic Elevator

Another new elevator system eliminates the operator. A person standing in front of an elevator shaft door interrupts a light beam stretched across the doorway. The interruption automatically opens both the shaft door and the elevator door when the elevator reaches the proper landing.

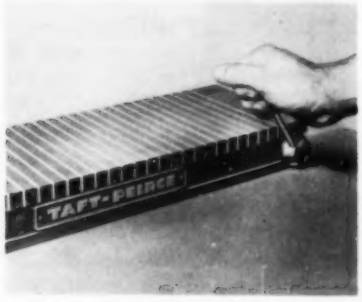
If, once inside, the passenger forgets to push a button indicating the floor wanted, a tape-recorded voice will remind him. **(Hitachi, Ltd., New Marunouchi Building, Chiyoda-Ku, Tokyo, Japan)**

New Drive Principle For Industrial Tractors

A new drive principle for industrial tractors has been introduced on Model GLT Dynamotive four wheel tractor. The Dynamotive power train consists of a high-output generator, direct-coupled to a gasoline engine. The generator powers a high-torque electric motor which, in turn, is direct-coupled to the differential

pinion. This new driving principle, the manufacturer reports, has an inherent high efficiency, resulting in a fuel saving of over 25%.

The elimination of clutches, torque converters, and mechanical or fluid transmission reduces the cost of maintenance and service parts. Engine life is prolonged because the transmission of road shock to the engine is eliminated —there is no mechanical connection between the wheels and engine. **(Automatic Transportation Co., Div. of Yale and Towne Manufacturing Co., Chicago 20, Illinois, U. S. A.)**



Magnetic Holding Device

Model 824 permanent-magnet chuck features all-over holding power and new faceplate construction. The faceplate magnets are separated by blocks of epoxy resin which cut down the weight of the chuck. In addition, they eliminate wheel loading while dressing. The chuck can be used for fine tolerance work.

The manufacturer says that problems with residual magnetism have been eliminated and workpieces can be put on and taken off quickly and easily. The magnet chuck is suitable for handling a wide variety of work—including grinding, light milling, shapng. **(The Taft Peirce Manufacturing Co., Woonsocket, Rhode Island, U.S.A.)**

New Freight Trailer

A new highway trailer is designed to transport railway wagons. Its chassis rests on 8 axles and consists of two hollow longitudinal beams of steel sheet, with the ends connected by solid cross beams. Plates of pressed steel sheet cover the whole setup. Tracks of angle iron are welded to the tops of the longitudinal beams, so that railway wagons can drive onto the chassis. Air springs raise or lower the chassis hydraulically with the addition or extraction of oil.

Only the two middle axles are held firm by the steering mechanism, while the other six are steered by the connecting rod of the trailer via a transverse rod. The front and rear wheels move in opposite directions making possible a curve radius of only 6.5 meters, despite the trailer's length of 8.6 meters. **(Siegener Eisenbahnbedarf AG., Dreis-Tiefenbach/Kreis Seigen, Germany)**

Protects Machine Parts

Plastic capsules are available to protect machine parts during transport. The BIKA capsules are a viscose product with a shrinking capacity of more than 40%. They can easily be slipped over gears, bolts, tubes, and various spare parts where they will shrink to fit tightly to the form of the part.

BIKA capsules come with diameters between 6 and 90 millimeters so that they can be used for all types of machine parts. Different colors make for easy arranging in the parts storeroom. **(Kalle & Co., AG., Wiesbaden, Germany)**

Home Air Conditioner

A flexible air conditioning system provides individual room temperature in any size or type of home. Highlight of the system is the new, compact Remotaire room unit. Each unit provides individual room comfort control at no extra cost to the builder, and eliminates the need for zoning.

Hot water for heating and chilled water for cooling are supplied from a remotely located boiler and chiller to the Remotaire room unit. Boiler and chiller can be placed in the basement, first floor utility room, or even in a garage for maximum space conservation. **(American Radiator & Standard Sanitary Corp., 40 West St., New York 18, New York)**

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. . . **Are you satisfied with the performance of your supervisors and workers?**

. . . **Would effective training improve their performance?**

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It's all among friends

Newport News is a friendly Virginia seaport town where the bankers, foreign consuls, shipping, and Chesapeake and Ohio Railway folks all know each other—generally on a first name basis.

If you are used to big-city procedures, you'll be surprised how fast things get done at Newport News, Virginia, where rails and water meet. It's a revelation to see how quickly your documents can be processed for bank delivery and collection, or other handling if desired.

But while Newport News, Va. (on Hampton Roads) has the intimacy of a small city, it also has the advantage of a big harbor. Hampton Roads ranks second among all American ports in number of sailings.

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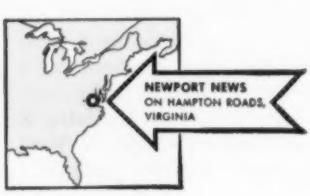

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Machine Produces Continuous Laminates

Called a surface-welding machine by its manufacturer, the Rotodorn laminates up to six low-cost, filled sheets with one or two high-grade covering sheets to produce a relatively thick composite ($\frac{1}{8}$ inch-thick vinyl floor tile, or a conveyor belting material, for example). An embossing nip can impart any desired textures to the outer surfaces of the laminate.

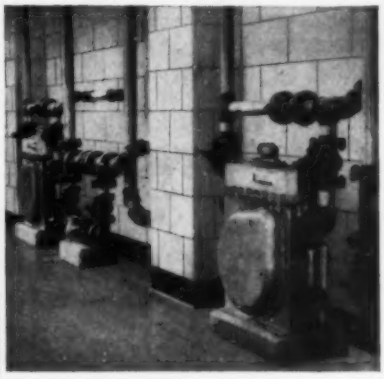
The surfaces to be welded are passed over large steam-heated drums, then over 17-kilowatt banks of infrared heaters that do the final softening, after which they are squeezed between pinch rolls. The several layers are successively welded in this manner, then the composite is reheated and passed through the embossing rolls where forces up to 8 tons can be applied. **(Ringler-Dorin, Inc., 880 Bergen Ave., Jersey City 6, New Jersey, U. S. A.)**

Table-Top Copier

The Antara Streamliner 200 is a low price table top whiteprinter with full printing width capacity of 107 centimeters. It reproduces quality prints of drawings, charts, business forms, etc.—anything typed, written, drawn or ruled on translucent paper. No inks, stencils or negatives are needed. The unit is 56 centimeters high by 69 centimeters deep. **(Antara, Diazo Division, General Aniline and Film Corp., 230 Park Ave., New York, New York)**

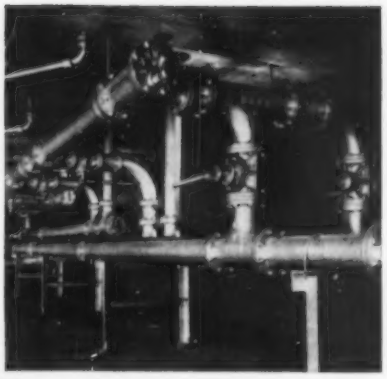
News of ROCKWELL

The protection of community health through modern sewage and wastes plants is a growing trend everywhere. To meet specific needs of modern wastes plants, Rockwell Manufacturing Company now has the world's most complete line of specially designed meters, valves and regulators.



SPECIALLY DESIGNED Rockwell sewage gas meters (like the ones shown above) provide accurate records to prove the economy of waste gases as fuel for sludge heating, generators, incinerators and plant heating. *Only* Rockwell has a complete line of aluminum, cast iron and pressed steel sewage gas meters specifically engineered to resist waste plant corrosion.

Rockwell sewage gas pressure regulators are also available with special corrosion resistant features for long life, precise pressure control. A complete booklet (in English) has been prepared on Rockwell meters, valves and regulators for sewage and waste plant services. For a free copy, write: Rockwell International Department.



LEAKPROOF, DEPENDABLE Rockwell-Nordstrom valves (shown on sludge lines above) are available in a complete range of sizes and types for sewage or waste plants. Rockwell Manufacturing Company is the world's oldest and largest manufacturer of lubricated plug valves.

FOR EVERY WATER MEASUREMENT NEED there is an economical, accurate Rockwell water meter. The world's most complete line, Rockwell disc, (above), piston turbine and compound water meters have been proven in literally millions of installations.

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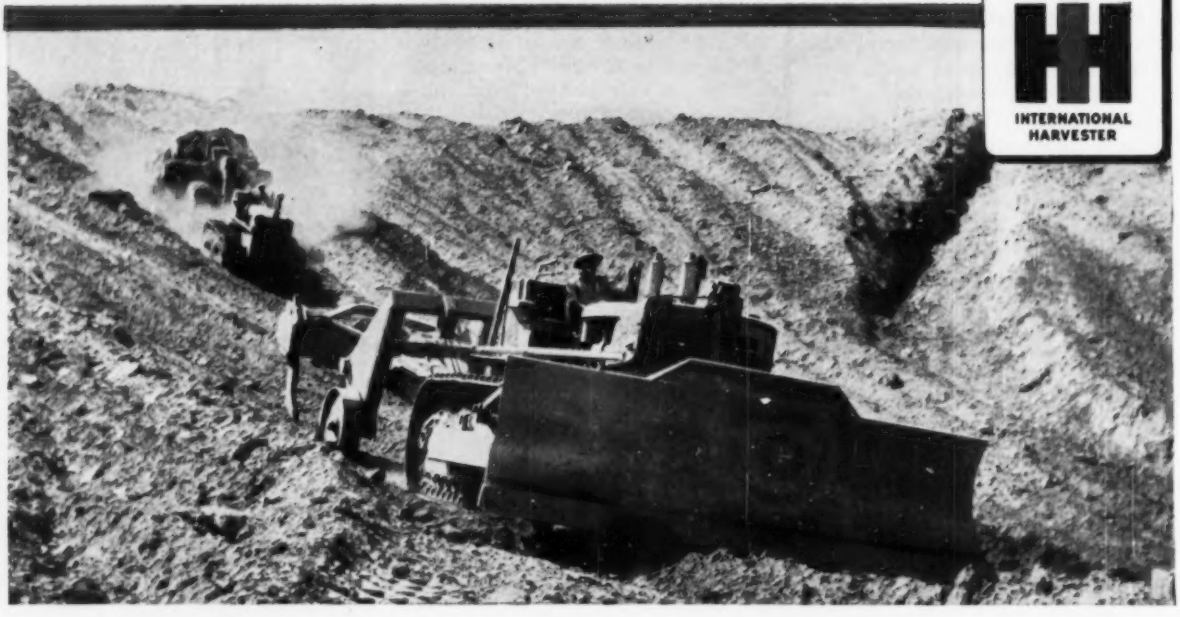
SENEGAL: *Satam, A.O.F., Dakar*
SOUTH AFRICA: *Negretti & Zambra S.A. (Pty.) Ltd. Johannesburg*
SPAIN: *Suministros SHAG S.A., Madrid*
SWEDEN: *Aktiebolaget Nordgas, Stockholm*
SWITZERLAND: *Technogas, S.A.R.L., Lausanne*
TRINIDAD: *Neal & Massy Engineering Co., Ltd., Port of Spain*
TURKEY: *Yakin Dogu Makine A.S., Istanbul*
UNITED KINGDOM: *Audley Engineering Company, Ltd., Newport* (Valve Products)
Astral Industrial Meter, Ltd., Crawley, Sussex (Industrial Meter Products)
FORMOSA: *Allied Engineering Service, Taipei, Taiwan*
INDIA: *Tahira Industries (India) Ltd., Bombay 2*
PHILIPPINES: *Florencio Reyes & Company, Inc., Manila* (Water & Gas Meters)
The Edward J. Nell Co., Manila, (Valve Products Industrial Meters)
THAILAND: *Tanarak Company Ltd., Bangkok*
PAKISTAN: *Steel Brothers & Company Ltd., Karachi*

ROCKWELL PRODUCTS SERVE THE WORLD—Rockwell-Nordstrom Valves • Rockwell Gas Water, Industrial and Gasoline Meters • Gas Regulators • Taximeters • Dual Parking Meters Fare Registers • Delta Power Tools • Walker-Turner Power Tools • Edward Valves

Two of five International TD-24 torque converter crawlers with matched IH equipment at work moving five million cubic meters of earth at suburban development, Caracas, Venezuela.



INTERNATIONAL HARVESTER

GETTING THE BIG JOBS DONE WITH INTERNATIONAL

When the job calls for the right combination of engineering skill and time-saving machines, the profit-minded contractor specifies International.

He knows that International provides him with the widest selection of dependable power, peak capacity and range of equipment fitted to his job requirements.

Whether you're a contractor, builder or basic materials producer, International offers you bonus-powered crawler tractors with matched IH blades for heavy digging, loading, pulling and pushing jobs . . . high-speed, big-capacity self-propelled scrapers and bottom-dump wagons . . . track and rubber tired loaders . . . giant off-highway trucks . . . heavy-duty multiple-purpose engines . . . plus a complete line of matched equipment for any job application.

Find out how you can power your way to increased profits by seeing your IH Construction Equipment Distributor. International Harvester Export Company, 180 N. Michigan Ave., Chicago 1, Ill., U.S.A.

INTERNATIONAL CONSTRUCTION EQUIPMENT

IH "75" Payscraper, champion high-speed, big-capacity earth-mover. 262 hp., 24 m.p.h., 20 cu. yds. heaped.

IH "95" Payhauler, tough, fast, giant off-highway truck. 335 turbo-charged hp., 38 m.p.h., 24 tons.

Aluminum Electrical Connectors

A series of electrical connectors made of aluminum make possible a major reduction in conductor clamp inventories. Heavy-duty U-bolt clamps, employing universal, parallel spacer grooves, now can be used on a wide range of cable sizes.

The six clamps, called series 580, are engineered in all proportions for the range of conductor size to be accommodated and the job to be done. The U-bolt portion, flattened to reduce bulk, provides wrap-around strength and even pressure distribution. **(Aluminum Co. of America, 1501 Alcoa Building, Pittsburgh 19, Pennsylvania, U.S.A.)**

Flourine Polymer

"Fluon" polytetrafluoroethylene is a general purpose material in the form of a dispersion for impregnating glass fiber and asbestos, yarns and fabrics. It can also be used for casting film and preparing filled molding powders.

One of the latest uses of this plastic material is a coagulated dispersion polymer which is an extrusion material developed for the production of thin wall tubes and wire coverings. "Fluon" has a working temperature of −80°C. to 250°C. **(Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London S.W. 1, England)**

ANTARA **O-M** — Desk-top model with many of the fine features found only on larger machines. Provides large-volume capacity. For prints and copies from originals up to 16″ wide (41cm) at speeds up to 30′ (9.14m) per minute.

ANTARA

gives you *all* the COPIES you need from just 1 machine!

Streamliner 400 — Economical, 2-step whiteprinter. Makes prints up to 42″ wide (107cm), at speeds up to 24′ (7.3m) per minute. Uses sheet or continuous roll stock. Front delivery of copies. Automatic stacking and collating.

Printmaster 810 — Moderately priced whiteprinter, for finest large-volume production. Synchronized developing and printing. Electronic fingertip controls. For prints up to 42″ wide (107cm), at speeds up to 40′ (12.2m) per minute.

In just seconds you can make *all* the copies you need... with the versatile ANTARA copying process. This method produces copies (or prints) of reports, charts, drawings, graphs, forms, letters, etc. . . . *anything* which is typed, written, drawn or ruled on paper that is translucent (lets light through).

ANTARA is easy to use. Just put in the originals and out come the clear, dry, legible copies . . . *exact* copies of the originals. There are no messy carbons, no duplicating inks, no stencils. And ANTARA is economical, too . . . costs less per copy than your daily newspaper!

ANTARA saves time . . . less re-writing and re-typing . . . *never* any proofreading or corrections to be made. Copies can be turned out in several colors and on a variety of materials . . . paper, cloth or foil. An ANTARA machine is a "must" for every efficient organization and office . . . and there's a model that's exactly suited for *your* needs.

Bambino — No larger than a typewriter! Can make 200 copies an hour from originals up to 9″ wide (23cm) or from 8′ to 10′ (2.5 to 3m) per minute on continuous roll. Low in cost; extremely economical to operate.

ANTARA representatives are located in all principal cities of the world. Write direct for further information, which will be airmailed to you promptly by: ANTARA, Diazo Division, General Aniline & Film Corporation, Johnson City, New York, U.S.A. Please address Department 10D.

CLARK EQUIPMENT moves mountains . . .

. . . of manganese ore

From stockpile on an Arizona hillside, this Michigan Tractor Shovel hauls manganese ore out on the trestle, dumps it into a crusher hopper. With hopper filled, clean-up chores keep the Michigan on the go This rugged, powerful, easy-to-operate machine is a champion time-and-money-saver on countless operations involving bulk materials.

. . . of heavy machinery

In the free-port of Copenhagen, this compact Clark truck handles awkward pieces of cement-making machinery on their way to Denmark's export markets. In several foreign countries, Clark has licensed manufacturers to produce many of the models in the Clark line. The world over, Clark sets the standards for materials handling equipment.

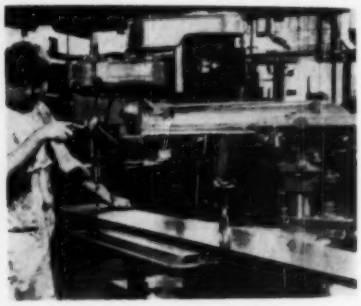
CLARK EQUIPMENT INTERNATIONAL, C.A.

CLARK® EQUIPMENT

BUCHANAN 4, MICHIGAN, U.S.A. Cable: Interclark

Associated Manufacturers in Australia, Belgium, France, Germany and U.S.A.

MORE PRODUCT DIGEST



Production Radial Drill

A new line of radial drill presses simplifies production operations by making it unnecessary to move jigs and other mounting fixtures. Because the spindle can be moved to the work, the tool provides great versatility. The drill press head moves in and out through an 18-inch travel radius.

Head, ram and cradle swivel a full 360° around the column to permit drilling anywhere on the table (which has four T-slots and an oil trough tapped to accommodate coolant piping) or on work that must be kept on the floor. The head tilts 45 degrees and locks on both sides to prevent angle deviation under heavy loads. **(Walker-Turner Div., Rockwell Manufacturing Co., 400 North Lexington Ave., Pittsburgh 8, Pennsylvania, U. S. A.)**

New Finish Makes Cottons Stain and Water Repellent

A new resin cotton finish, known as the Spic'n Spandy' Howcol finish, is claimed by the company to be the first 100% successful stain and water repellent finish for cottons. The fabric is treated after weaving and printing. The fabric can still "breathe."

In addition to being stain and water repellent, the material is claimed to be quick drying, crease resistant and needs little or no ironing. It can be washed in any normal soap or detergent. After the treatment, the material is pliable and silky, lending itself to pleating and draping, etc. and the finish will endure for the life of the garment. **(Rossendale Mills, Ltd., 60 Berners St., London W. 1, England)**

HIGHLY INTIMATE BLENDS IN 3 TO 5 MINUTES

Sturtevant blending continues during discharge - no segregation or flotation

Sturtevant Rotary Blenders start 4-way blending while charging, continue it during discharge, thus producing highly intimate, even blends of dry and semi-dry materials — within 3 to 5 minutes of start of charging.

Six *complete* blending cycles per hour are common. And Sturtevant's special action produces no particle reduction, cleavage or attritional heat — is highly effective yet gentle and safe even with explosives.

10 cu. ft. Sturtevant Blender at U.S. Steel Corp.'s new Applied Research Laboratory (Raw Materials Division) in Monroeville, Pa. This unit handles batches up to 500 lbs. — is ideal for pilot work and small runs.

One of four 450 cu. ft. Sturtevant Blenders at Celriver Plant of Celanese Corp. (Rock Hill, N.C.). These large units handle up to 20,000 lbs. batches — have a 9-year record of meeting the most exacting blending requirements.

Receiving

Scoops cascade material as drum rotates. Movement forces material from both ends to middle. Thus blending is 4-way — circular, vertical and two lateral.

Discharging

Single gate controls charge, discharge. Blending continues throughout discharge phase. Result is no segregation or flotation — highly intimate, even blends.

Self-cleaning, dust-sealed drum; fast, one-man accessibility

Operation of Sturtevant Blenders is self-cleaning. Drum interiors are completely dust-sealed; special design of stuffing box fully seals against leakage. For inspection of all models, one man simply loosens a few lugs to remove manhole cover — quickly and easily.

Fully or semi-automatic, or manually controlled operation

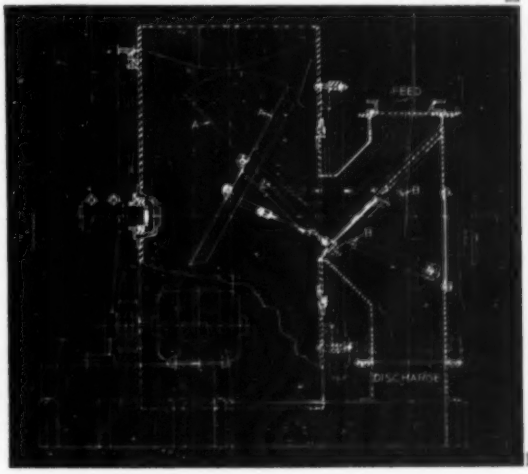
Constructed of carbon steel, stainless steel or Monel metal, Sturtevant Rotary Blenders are engineered to fit each customer's needs — can be supplied with injector sprays and any desired control system.

For more on Sturtevant Blenders, request Bulletin No. 080B. (See coupon for available bulletins on other Sturtevant machinery.) Write today.

STURTEVANT MILL CO.

Nine standard models with capacities to 900 cu. ft.

Pilot plant blending to largest production runs are handled by standard models of Sturtevant Blenders with capacities from 10 cu. ft. to 900 cu. ft. Rotary drum design is a proven spacesaver, including headroom. Write for Bulletin No. 080B giving complete specifications.



Sectional view of Sturtevant Blender

'A' (solid line) shows swinging chute in blending position; 'B' (solid line) shows gate closed for blending. 'A' (dotted line) shows swinging chute in discharging position; 'B' (dotted line) shows gate open for discharging.

My dry-process materials are: _____

Desired capacity is: _____

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

STURTEVANT MILL COMPANY, 141 Clayton Street, Boston 22, Mass.

Please send me your bulletin on Blenders ☐
Also bulletins on machines for:

☐ CRUSHING ☐ GRINDING ☐ PULVERIZING
☐ MICRON-GRINDING ☐ AIR SEPARATING ☐ MIXING
☐ SCREENING ☐ GRANULATING ☐ CONVEYING

THIS CHAMP LICKS EVERY LIGHTING AND WELDING JOB!

BECAUSE THERE'S MORE GAS PER POUND

In The Familiar Green Drum Of Shawinigan "S" Brand Canadian Carbide

For more than fifty years Shawinigan "S" Brand Canadian Carbide, in its familiar green drum, has been used throughout the world to meet the most exacting job requirements. To be sure that the green drum you buy contains Shawinigan "S" Brand Canadian Carbide, look for the Shawinigan "S" trademark.

The quality of Shawinigan's many other chemicals is also helping industry to achieve higher standards around the world. Whenever, wherever, you need carbide or other organic chemicals to do a better job—always specify Shawinigan.

Acetic Acid
Acetic Anhydride
Acetylene Black
Butyl Acetate
Calcium Carbide
Dibutyl Phthalate
Ethyl Acetate
Monochloroacetic Acid
Butyl Alcohol

SHAWINIGAN
TRADE MARK REGISTERED

SHAWINIGAN CHEMICALS LIMITED

Shawinigan Building, Montreal, Que., Canada

New Copying Machine

The "SECRETARY" copying machine is small enough (17 inches wide by 17 inches long by 9 inches high) to be used on an office desk. It makes error-proof, dry copies of originals in about four seconds, according to the manufacturer. The originals may be printed on one side or both and of any color.

When equipped with a Universal transformer, the "SECRETARY" operates on any voltage from 90 to 250 volts alternating current. The machine uses a special light and a special copying paper. There are no liquids, negatives or master copies involved. It copies in one step direct from the original in the open office or plant—regardless of lighting conditions. **(Minnesota Mining and Manufacturing Co., International Div., 900 Fauquier Ave., St. Paul 6, Minnesota, U.S.A.)**

Fire Extinguisher for Powdered Metals

A special purpose fire extinguisher has been designed for use in fires involving powdered metallic sodium, magnesium or aluminum. Model PDMU is charged with 25 pounds of a dry chemical powder—discharged under pressure provided by carbon dioxide gas. The powder is applied to the burning metal by a cone spreader.

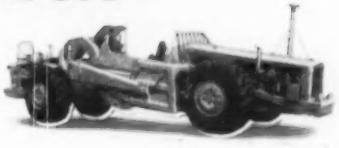
This applicator discharges the chemical powder lightly onto the fire, thus preventing scattering. The extinguisher is operated by moving a safety clip, detaching the applicator and striking the top of the extinguisher. A "squeeze grip" control valve enables the flow of powder to be shut off at will. **(Pyrene Co., Ltd., 9 Grosvenor Gardens, London S. W. 1, England)**

This "ONE-MAN GANG" cuts earthmoving costs

• Developed and pioneered by Euclid, the Twin-Power principle utilized in the Model TS-18 makes it a top performer on a wide range of work. Unequalled for power and traction, this "Euc" Scraper is self loading in most materials—works without the supplementary push tractor required by other scrapers. On large earthmoving projects or smaller industrial operations, this one-man tool increases production and cuts the cost per ton or yard of material moved.

Two diesel engines, one in the tractor and one behind the scraper bowl, provide 436 or 518 total h.p. Separate Torqmatic Drives consisting of Allison torque converters and semi-automatic transmissions assure a smooth, steady flow of power to all four wheels. The TS-18, with a struck capacity of 18 cu. yds., works under job conditions that stop other scrapers. Its versatility makes it a profitable machine for high production work or as a utility tool on big jobs and many industrial operations.

TWIN-POWER
TS-18
EUCLID SCRAPER



The TS-18 Scraper is typical of advanced engineering that has made Euclid a leader in the heavy construction equipment field. If your operations require moving large tonnages of earth, ore and other materials, learn why Euclids are your best investment. Complete information is available from your Euclid dealer or write direct.

GENERAL MOTORS OVERSEAS OPERATIONS
1775 Broadway, New York 19, N. Y., U. S. A.

EUCLID (GREAT BRITAIN) LIMITED
Newhouse, Lanarkshire, Scotland

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

200-Ampere Welder

Dual service, gasoline-engine driven welder weighs 408 pounds. Operating on 30 volts direct current, 50% duty cycle, it has a welding range from 45 to 200 amperes. It will provide (when not welding) 1500 watts of alternating current to operate electric drills, saws, etc., or for flood-lighting or standby emergency service. **(D. W. Onan & Sons, Inc., Minneapolis, Minnesota, U. S. A.)**

Miniature Nuclear Battery

A miniature nuclear battery was unveiled recently, but it will not be available commercially for about three years. Unlike relatively short-lived chemical batteries whose useful life depends on energy withdrawal, the newcomer reportedly will last about five years regardless of how much use is made of it.

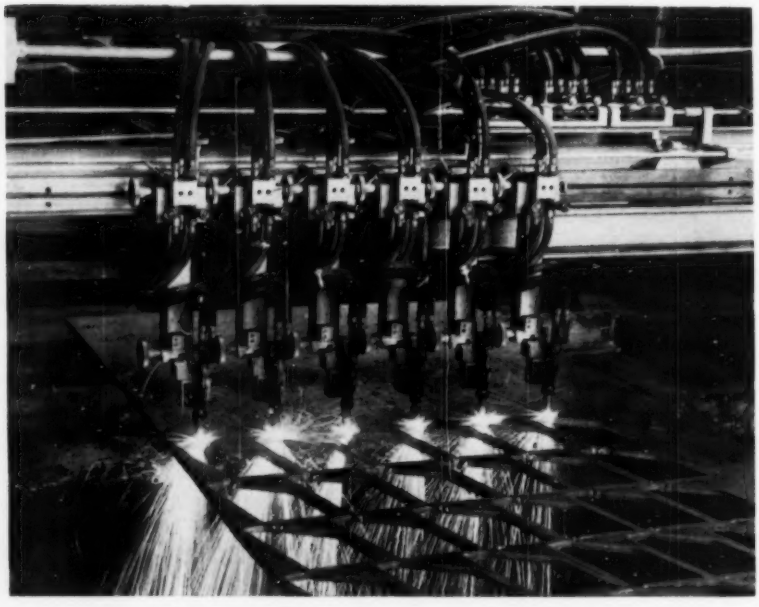
The battery's fuel is the radioisotope, promethium-147. Mixed with a cadmium sulfide phosphor, promethium-147 oxide emits β-particles, which are absorbed by the phosphor and converted into infrared radiation. Soaked up by a silicon photocell, this radiation is transformed into usable electrical energy.

It is expected that the battery will be used in wrist watches, hearing aids, portable radios, etc. The present high cost and scarcity of promethium-147 are holding back marketing of the new battery. **(Walter Kidde Nuclear Laboratories, Inc., Garden City, New York; and Elgin National Watch Co., Elgin, Illinois, U. S. A.)**

Tractor Has 4-in-1 Bucket

A new line of four-wheel-drive "PAYLOADER" tractor-shovels will now offer Drott "4-in-1" buckets as optional equipment. The identification "4-in-1" comes from the fact that this attachment can be used as a shovel; as a clamshell; a scraper, or as a bulldozer.

Used as a conventional tractor-shovel bucket, the attachment can dig, carry and dump in the regular manner. Its powerful clamshell action can be used to clean up small piles, to pick up material without tractor travel, or to grasp and handle stumps, pipe, timbers and the like. With a slight clam-lip opening, the attachment becomes a scraper that heap-loads itself, carries and spreads thin layers or dumps completely. It strips sod and grades accurately. With the clamp-lip fully open, the attachment acts as a bulldozer—with hydraulic fingertip blade-pitch control to regulate dozing depth. **(The Frank G. Hough Co., Libertyville, Illinois, U. S. A.)**



Profile Cutter Makes Multiple Copies

The oxygen cutting machine above is half of a double unit that can cut steel plate from $\frac{1}{4}$ inch to 15 inches thick from a few square inches up to 10 by 60 feet. A black and white drawing is used as the pattern and followed on the cutter by photoelectric means. **(Messrs. Hancock & Co., Ltd., Croydon, England)**

MONSANTO

BASIC SOURCE | DETERGENTS

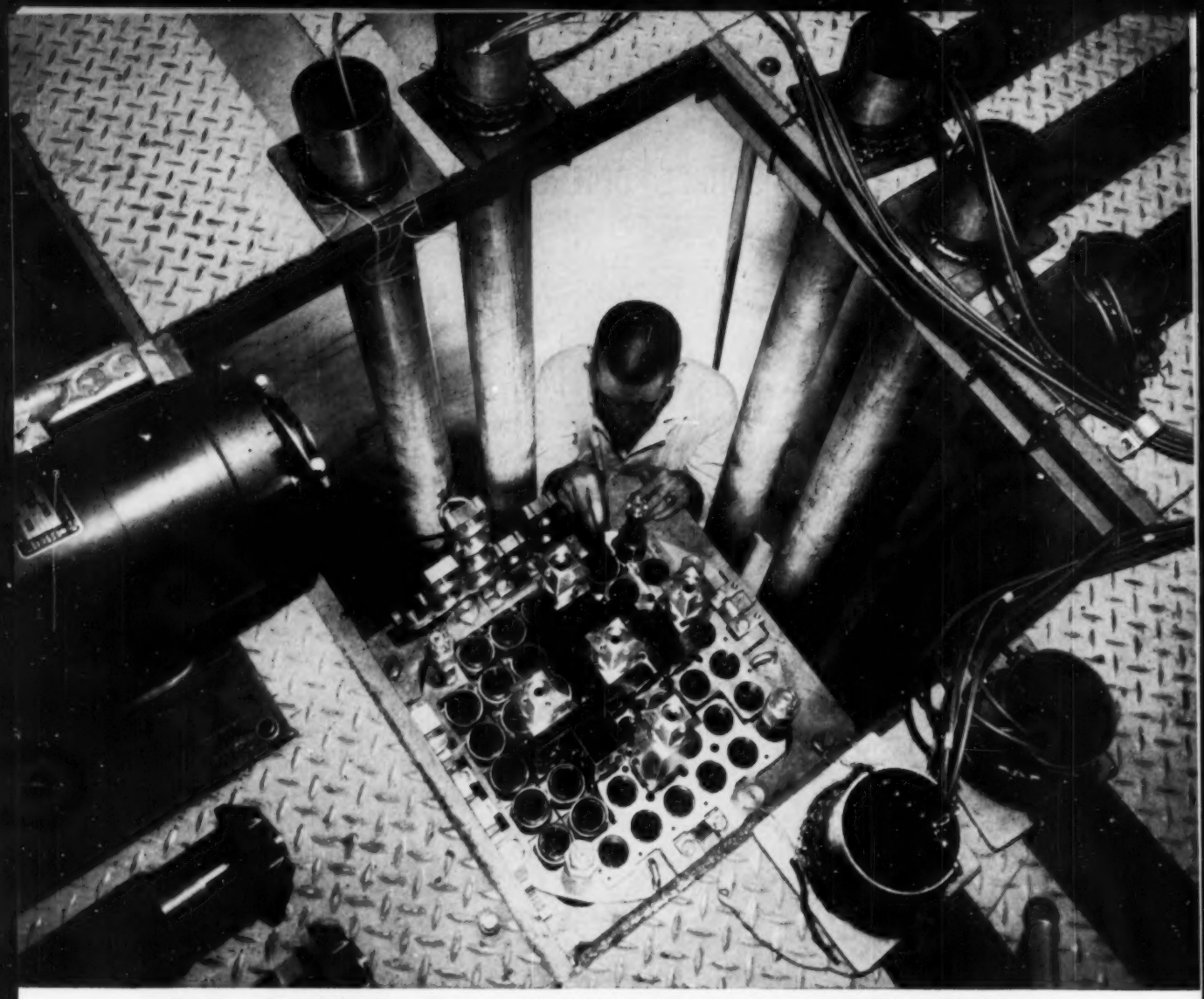
ONE JOB faces almost every industry, big or small. Dirt, grime or grease must be loosened—and then washed away. Today, chemistry provides the way to make these jobs easy, fast and economical. Monsanto, the world's largest producer of phosphorus, has developed a whole series of detergents and detergent phosphates to help business and industry do specific and difficult cleaning jobs better.

MONSANTO

Where Creative Chemistry Works Wonders for You

MONSANTO CHEMICAL COMPANY, ST. LOUIS, U.S.A.

Dependable service from Monsanto representatives in the principal cities of the world.



Reactor core of Army Package Power Reactor is checked by technician prior to tests in ALCO's criticality facility at Schenectady, N. Y.

POWER FROM THE ATOM IS READY TODAY

ALCO's commercial pressurized-water reactor can bring stable, safe atomic power to fuel-short areas anywhere

Basic design and engineering for the ALCO atomic plant are complete. Experience with the Army Package Power Reactor—built by ALCO and scheduled for operation at Fort Belvoir, Va., this Spring—has contributed to the commercial plant design. This means that the plant is not experimental, not in a planning or design stage, but a safe and reliable source of power.

The ALCO atomic plant is available to 20,000 kw. Because design is substantially complete, cost is lower than that of experimental reactors and delivery is faster. ALCO also owns and operates a unique "criticality facility" to check reactor performance and to insure design performance *before* installation at the plant site.

Atomic power may be the answer to your fuel problems, and ALCO's atomic plant is ready now. For complete information, including the brochure "Competitive Power from the Atom," write Atomic Projects, Dept. AES-1, P. O. Box 1065, Schenectady 1, N. Y., U.S.A.

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● YOUR MANAGEMENT READING

Management Digest's editorial staff here again does the "worthwhile reading" for you to save your time. For the following literature, please write on your company letterhead directly to the address given, mentioning Management Digest.

Forecasting Sales—AMA Special Report 16 tells how a practical sales forecasting program can identify and anticipate customer needs and demands. The report features a survey of sales forecasting practices of nearly 300 companies. Price: $3.75. (American Management Association, 1515 Broadway, New York 36, New York.)

Meetings 'Round the World—Booklet lists forthcoming international scientific and technical meetings scheduled through 1959. Price: 25¢. (Supt. of Documents, U.S. Government Printing Office, Washington 25, D. C.)

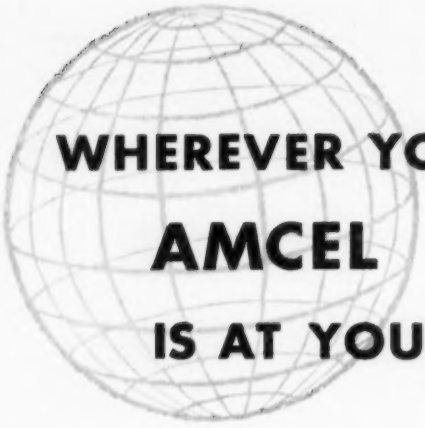
Bulletins from Industry—Giffels and Vallet, L. Rossetti, will tell you all about their worldwide plant construction and engineering services: plant design, layout, processing, materials handling, machine design, etc. (Giffels & Vallet Inc., L. Rossetti, 1000 Marquette Building, Detroit 26, Michigan) . . . Engineering and operating features of Allis-Chalmers forklift trucks, towing tractors, and Chore Boy platform trucks are presented in Catalog BU-305. (Allis-Chalmers Manufacturing Co., Milwaukee 1, Wisconsin) . . . The use of proper inventory control to balance stocks, reduce costs, and increase profits in wholesaling operations is described in brochure KD-772. (Remington Rand International, 315 Fourth Avenue, New York 10, New York.)

The Package Sells—"The Selling Power of Packaging" records what to look for in a good packaging design, and shows how to integrate packaging with selling, advertising, and merchandising. Price: $3.50. (McGraw-Hill Book Company, 330 W. 42nd Street, New York 36, New York.)

Handy Handbooks—Tinplate Handbook covers such topics as world production figures; manufacture; grades; quality; packing; ordering; testing and applications. (Tin Research Institute, Fraser Road, Perivale, Greenford, Middlesex, England.) . . . Special Issue of AEG PROGRESS—"Control and Regulation"—presents the basic concepts of automatic control engineering; describes apparatus used and its technical applications. (Allgemeine Elektricitats-Gesellschaft, Kenbrunnenstrasse 107a, Berlin N. 31, Germany) . . . "Electric Motors and Controls" covers ac and dc motors and the instruments used for controlling them. Price: 8/6 or $1.19. (British Electrical Development Association, 2 Savoy-Hill, London, W. C. 2, England.)

Productivity on the Farm—"Technical Co-operation in Latin American Agriculture" is the first major evaluation of the large scale efforts of the U.S. Point Four program, United Nations, American International Association, and several other organizations toward increasing farm productivity. There are case studies of individual programs, their successes and shortcomings, and the impact of their combined efforts. Price: $6.00. (University of Chicago Press, 5750 Ellis Avenue, Chicago 37, Illinois.)

"Mathematics of Business"—This broad-based handbook on business mathematics looks into integers, decimal fractions, percentage and discounts, algebraic equations, linear systems, exponents and logarithms, simple and compound interest, merchandise mathematics and annuities. Price: $4.50. (Harper & Brothers, 49 East 33rd Street, New York, New York.)



WHEREVER YOU ARE—
AMCEL
IS AT YOUR SERVICE

One invaluable Amcel export (and it is yours without charge) is Celanese *skills*. We deliver them for the asking with Celanese chemicals, plastics and textiles—from product development and testing in Celanese plants, to technical knowledge for yours.

How best to use a chemical raw material? How to evaluate a new plastic? How to develop a specific fabric to meet new requirements? All these questions (and many, many more) will be cheerfully answered by Celanese' unmatched laboratories and technical know-how.

For we have learned that helping you produce the best possible product is not only better for your business—but for ours as well.

AMCEL
representatives are located in
Asia, Europe, Africa and Australia

Australia, Sydney, N.S.W. . . . James Hardie Trading Co. (Pty.) Ltd. . . . Plastics & resins.
Australia, Melbourne . . . Hardie Trading Co. Ltd. . . . Plastics & resins.
Austria, Vienna XIX . . . Eugen Farber . . . Chemicals, plastics, resins, C. A. flake & textile products.
Belgium, Brussels . . . Keyser & MacKay . . . Resins, & C. A. flake.
Belgium, Gand . . . Cocentra S.P.R.L . . . . Chemicals & textile products.
Denmark, Copenhagen . . . Johan Foge Jensen . . . Chemicals.
Denmark, Copenhagen . . . A/S Industriprodukter . . . Plastics & resins.
Egypt, Cairo . . . Padova & Co. . . . Textile products.
England, London . . . A. Revai & Co. (Chemicals) Ltd. . . . Chemicals.
France, Paris . . . Pautrot & Bonnet . . . Chemicals.
France, Paris . . . . . Loiret & Haentjens . . . Plastics.
Holland, Amsterdam . . . N. V. Consolco . . . Chemicals.
Holland, The Hague . . . Handelsmaatschappij Vos & Co. . . . Plastics.
Hong Kong . . . Optorg Co. (Malaya) Ltd. . . . Chemicals, plastics & resins.
Hong Kong . . . Getz Bros. . . . . Textile products.
Indonesia, Djakarta-Kota . . . Messers. N. V. Agung . . . Chemicals, plastics & resins.
Israel, Tel-Aviv . . . E. Huppert . . . Plastics & resins.
Israel, Tel-Aviv . . . Manfred Gottesmann . . . Chemicals & textile products.
Italy, Milano . . . Usvico (Societe Industriale Commerciale) . . . Chemicals, plastics & textile products.
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Philippines, Manila . . . Union Trade Distributors . . . Plastics & resins.
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Rhodesia, Bulawayo . . . . John Beith (Rhodesia) Pty. Ltd. . . . Chemicals.
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EQUIPMENT
for
Power Plants and Substations

HITACHI's waterwheel driven alternators are backed with more than forty years of indefatigable research and engineering experience. Several thousands of HITACHI alternators in a wide variety of capacities have already been installed with satisfactory results in power plants both at home and overseas.

Waterwheels	D. C. Generators	Static Condensers
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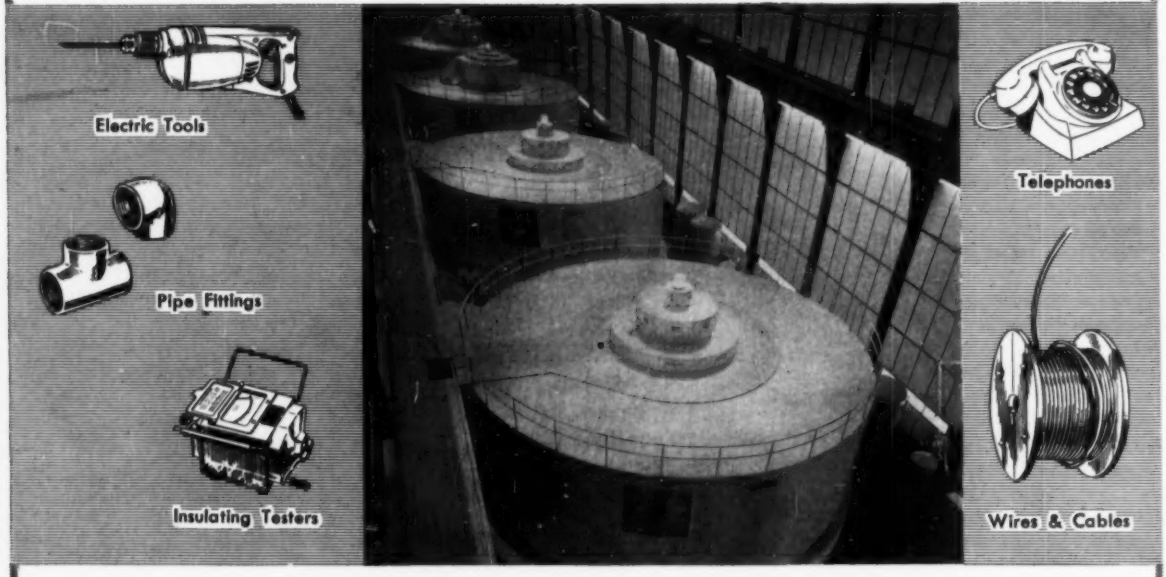


Pictures show the most powerful group of generators in Japan, installed at the Sakuma Power Plant. Each unit driven by a 100,000 kW Francis Turbine yields 93,000 kVA of electric energy. The two units in the foreground, complete with turbines, have been supplied by Hitachi, Ltd.

Hitachi, Ltd.

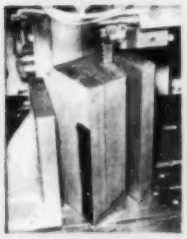
Tokyo Japan

Cable Address: "HITACHY" TOKYO

DoALL Demon Saw Band makes world's fastest machining method . . . even faster

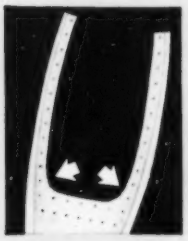
Slice through toughest steel 6 times faster!

Jobs formerly done on mills, planers, shapers, lathes now done faster and for less with DoALL . . .



SLOTTING job took 325 minutes on a milling machine . . . 72 minutes on DoALL.

SPLITTING. Cutting time reduced from 10.8 to 3.6 minutes on a DoALL.



CONTOUR steel forging. No machine but a band machine could do it. Time: 7.8 minutes.

CUTTING FROM SOLID. DoALL saved 19% in time.

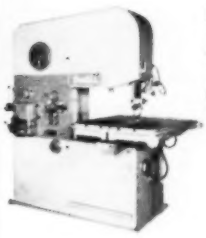
CUT GRINDING RELIEF. 78% time savings. One man in one hour does former 4 hour job.

CUT-OFF TITANIUM. 6½" dia. x .030 thin wafer cut at 1.2 in. per min.

DoALL Demon high speed steel saw bands slice through the toughest steels up to 6 times faster—last up to 10 times longer than any saw band ever produced. They will machine up to 10,000 square inches of mild steel at 10 square inches per minute and withstand temperatures up to 1100° without losing tooth hardness. They work fast at frictional heats that would burn up ordinary blades.

The continuous cutting Demon blade will deliver cuts never before possible. But what's more . . . with *the combination of DoALL Demon blade and DoALL Contour-matic,* jobs formerly done on expensive milling machines, shapers, planers and even lathes are now being done faster and at far less cost. That's because the band machine requires little fixturing, cuts faster, right to the layout line, rather than reducing expensive materials to a pile of worthless chips—and the DoALL machine *costs only ⅕ to ½ as much as other machine tools.*

Shown at left are just a few examples of the production notching, slitting, cut-off, slotting, 3-dimensional, contour and compound angle cuts possible on the DoALL—The world's newest, fastest and most economical machining method.



New DoALL Contour-matic

Hydraulic feed table, integral coolant system, tilting table, infinitely variable speed and feed, high horsepower, greater rigidity . . . has more, does more than any other band machine made.

C58 Automatic Cut-off

Automatic indexing, variable speed for sustained high production cut-off work. Any type or stock thickness.

WRITE FOR LITERATURE on DoALL Contour-matic or Cut-off Machines and for catalog on 18 types of DoALL saw bands in 300 width-pitch-type combinations.

DoALL—Manufacturers of Band Machines and Blades . . . they go together.

DoALL

The DoALL Company
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DoALL is the world's largest manufacturer of band machines and blades . . . producing a full line of both contour and cut-off power saws as well as saw bands to fit every purpose . . . every purse.

58-57

Over 700 pieces of clothing are cut out each day by this machine. These mass-produced garments must be marketed in great volume to be profitable

Volume like this cuts costs

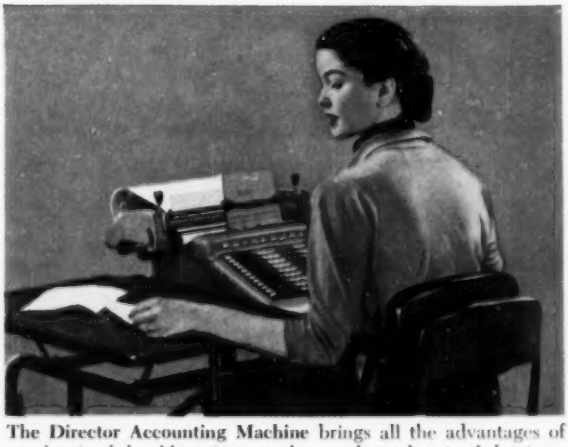
...when managed by machines like this

For every machine that turns out products at high speed, there's a business machine to handle the paper work. For no matter how small a business is, to market volume at a profit requires modern business methods. And Burroughs provides the most advanced business systems and machines available.

Consider the famed Director Accounting Machine now widely used in small and medium-sized business operations. It's fast and it's accurate. It handles any type of posting and uses numerical reference or character abbreviations to describe accounting entries. A choice of models with variable features makes this machine unusually adaptable to many jobs.

See your Burroughs man for details. He's a specialist in the latest business methods and machines available. Let his experience and knowledge help your business grow.

Call your Burroughs man



The Director Accounting Machine brings all the advantages of mechanized bookkeeping to the moderately sized business